THE IRON AGE

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Advanced Steps in Industrial Management

Meeting the Human Phase of the Problem Through Devices for Minimizing Fatigue and Through Fostering the Habit of Reading

Some time ago an item was printed in these columns explaining how Frank B. Gilbreth had established at Providence, R. I., the nucleus of a collection of devices calculated to minimize fatigue of the factory worker. The idea was not predicated primarily on the now well-recognized necessity of providing periodic rest intervals, particularly in highly laborious occupations, but on the less well apprehended possibility of injuries resulting from processes or methods overlooked in the investigations up to date. The development of the exhibit has been slow and amounts to mainly a collection of models and articles for which Mr. Gilbreth has alone been responsible. Contemporaneously with it, however, has started a movement for which Mr. Gilbreth has also been given the credit, looking to the fostering of a reading habit among factory workers. This movement has met an encouraging response and, for the time being at any rate, has overshadowed the anti-fatigue movement, as it has been called.

Both ideas are in effect advanced steps in scientific management, and are particularly bright examples of the increasing part which the human side is gaining in industry. The elimination of useless motions is, of course, of paramount importance in arriving at the task in the scientific analysis of how production may be improved. It typifies also that new relation which scientific management brings about in that the employer takes special means to assist the employee with equipment, surroundings and a plan of work likely to be mutually advantageous. When, therefore, not alone are tiring, unnecessary motions done away with but conditions in connection with these motions are discovered which may have a detrimental effect on the human organism, then it is felt that study to ameliorate the situation is a development under scientific management. It is essentially humanitarian in that increase in output may not be shown, except perhaps over a long period of time, when what is really meant is there is no impairment in the individual's capacity for work. For example, a certain form of shoes may be decidedly better for a given occupation than another. The difference may not be great enough to manifest itself in the output. The work itself may have had the scientific attention which has established everything which goes together best for all concerned, including the type of individual worker, but the kind of clothing, except as regards safety, may have no commercial bearing. Yet if through a line of reasoning or investigation some detail of the clothing appears to be markedly better, though perhaps not seemingly essential, the fact that studies of this kind are made describes the change coming over master and man relations and are regarded as decidedly worth while.

It is along this line that the anti-fatigue investigation lies. A concrete illustration will help. A machine is operated from a foot treadle. Each cycle of operation may require merely slight pressure on the treadle. The vibrations of the machine, however, may be very heavy. They are transmitted to the body of the operator. The body may have become inured to the jars, but your humanitarian investigator becomes convinced that without these jolts, the human being can get along very well. He does not argue that increased output will necessarily follow by putting on the soft pedal, but is emphatic that improvement in this detail is worth while in itself, with which idea most anyone will agree. So, Mr. Gilbreth has studied

to some extent the provision of springs, or releasing catches, in connection with foot-operating devices for machinery, so the foot does not have to remain in contact with the treadle.

Three of the accompanying illustrations tell of another investigation of his looking to the avoidance of unnecessary fatigue. They represent chairs designed for factory workers. It is held that there is hardly a vocation that cannot have a special chair designed for it that will allow greater outputs with less fatigue. In such instances the humanitarian object is backed by a measurable industrial gain. Two of the pictures show the side and back, respectively, of a chair for a man doing heavy filing at a vise. The chairs have been built to give the best location of the feet of the workers, so they may file just as well sitting as standing up. There is a projection extending from near the bottom of the chair to receive the man's right foot, and he may, as needed, secure leverage against a brace fixed to the foot rest. Mr. Gilbreth reports that since using the chairs filers have done more and better work and are in better physical condition at the end of the day than before. Another of the pictures shows how an ordinary chair has been suited to some individual and some particular job by merely lengthening the legs. Chairs have been equipped with casters to allow them to be pulled easily from place to place.

The other development to which reference has been made—the institution of what is called the "Home Reading Box Movement,"—partakes a little of paternalism, but the main factor is that it is working well. One idea back of the movement, to quote Mr. Gilbreth, is, "The average worker has two drawbacks. In the first place he has no vocabulary. In the second place he cannot read fast, or remember what he does read. Ask him to read an ordinary paragraph and then to repeat it in his own words, and he stumbles and halts and falls down like a boy at school who hasn't learned his lesson. To give him a vocabulary and to get him into the habit of reading fast and also assimilating as he reads—these are necessary things."

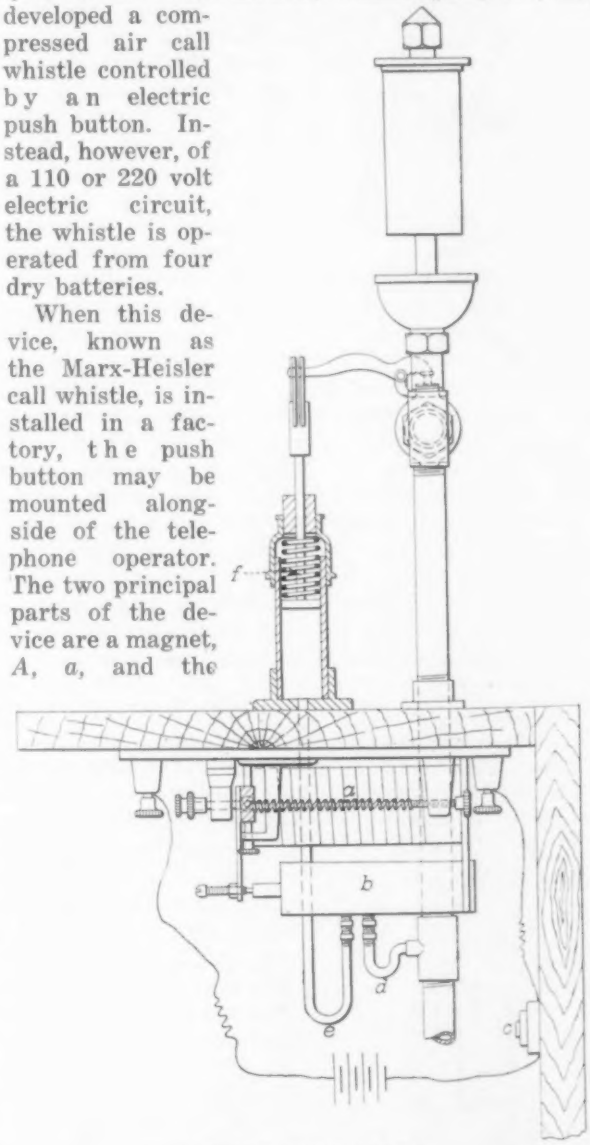
Magazines and trade literature are placed in a receptacle in some portion of the works easily accessible to the employees. The literature comes mainly from homes where magazines are plenty. The scheme is that when the magazines and other reading matter have served their purposes in a given home, the publications are placed in that home's reading box against the call of the reading-matter collector. Collections are made commonly by automobile and the factories served are apportioned their share of the literature. There appears to be no special organization handling the matter, but instead the plan is in the hands of friends who have engaged to give something of their time to interest householders in saving their used magazines and other publications and have agreed to make the collections. The participants have entered into the plan as they would in any public service and it rests with each individual merely to take care of his section of the city. In Mr. Gilbreth's own home, his reading box is located in a conspicuous place in the front hall of his residence. The box is numbered 34, as here shown, but why 34 and not 23, does not appear. At first thought, 23 would have been quite appropriate, though foreign readers will not be able to appreciate this, not being familiar with North American colloquialisms. Readers in Mr. Gilbreth's household mark the number of the box on literature with which they are through and the housemaids see that such literature reaches the box.

It is interesting to note that the workmen show discrimination in the choice of their reading matter. Some avoid the magazines of the day. Others say that they cannot understand the English. In one of the boxes recently over a dozen copies of a so-called popular magazine were found after the workmen had taken out what they wanted. For experiment, these copies were taken out and mixed with a fresh batch of reading matter brought in by the collectors. The lot was dumped into the box and the original copies of the magazine on trial were left, and several more which had come in with the fresh batch. Finally it may be said that the movement is gaining in popularity with both the homes supplying the reading matter and with the factories receiving it.

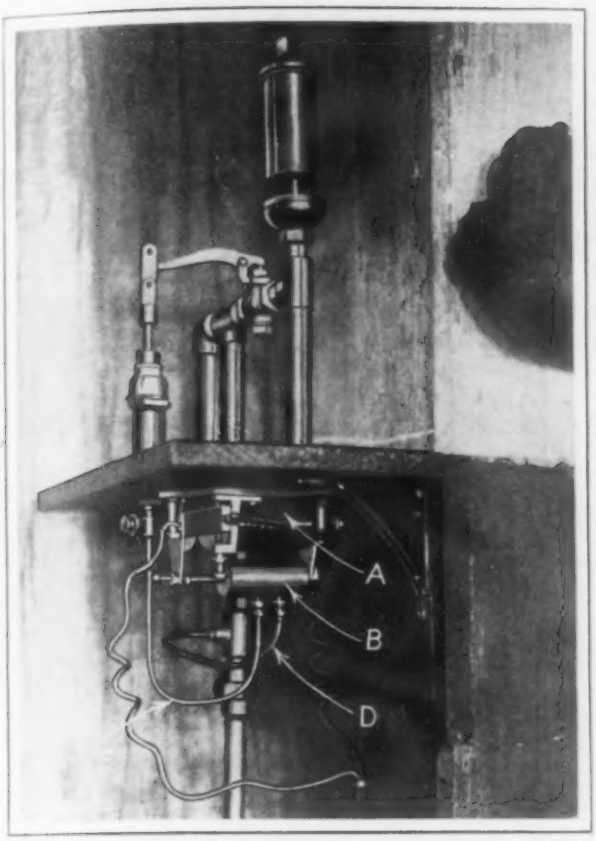
A Compressed Air Factory Call Whistle

For calling foremen, superintendents and others who frequently have occasion to leave their posts to go to different parts of a manufacturing establishment, the Newton Machine Tool Works, Inc., Twenty-third and Vine streets, Philadelphia, Pa., has developed a compressed air call whistle controlled by an electric push button. Instead, however, of a 110 or 220 volt electric circuit, the whistle is operated from four dry batteries.

When this device, known as the Marx-Heisler call whistle, is installed in a factory, the push button may be mounted alongside of the telephone operator. The two principal parts of the device are a magnet, *A*, *a*, and the valve *B*, *b*. When the button *c* is pressed the circuit is closed through the battery and the magnet and the armature of the latter is attracted toward the pole piece. Attached to the armature is a downwardly projecting extension, which, when the magnet is energized, is brought in contact



Details of the Whistle



A Recently Developed Call Whistle for Factories in Which the Admission of the Air is Regulated by a Push Button

with the projecting stem of the valve *B*, *b*. This stem is pushed in so that air flows into the valve through the pipe *D*, *d* from the compressed air line and out through the pipe *E*, *e*, the air compressing the spring *f* and permitting the whistle to operate. As soon as the pressure on the button is released the armature of the magnet flies back and the air which is flowing into the valve through the pipe *D*, *d* forces the stem back and cuts off the entrance to the pipe *E*, *e*. An exhaust port is provided for the valve to permit the spring to force out the air when the pressure is removed.

Chemical Society Visits Middletown

The American Chemical Society held its annual convention in Cincinnati last week. After the regular routine business was transacted the society accepted an invitation from the National Cash Register Company, Dayton, Ohio, and the American Rolling Mill Company, Middletown, Ohio, to visit their respective plants. On Friday, April 10, a special train conveyed the party to Dayton and subsequently to Middletown, where George M. Verity, president American Rolling Mill Company, made the address of welcome. Charles R. Hook, general superintendent, and G. F. Ahlbrandt, assistant sales manager, divided the visitors into small groups and gave each party a competent guide. After going through the new East works they were taken to the Central plant, and then inspected the company's chemical laboratory. A luncheon was served, after which short talks were made by different metallurgical chemists. The visitors numbered about 500.

Members of the United States Commission on Industrial Relations, following its six days of hearings on conciliation, arbitration and collective bargaining, in connection with labor controversies, informally express the opinion that the commission will recommend to Congress a Federal industrial board organized along the lines of the Newlands act to serve as a voluntary conciliator and mediator in industrial disagreements, particularly in industries doing an interstate business. It is possible that the commission may recommend a series of boards instead of one.

Norton Safety First Association

A Safety First Association was formally organized March 20 among the officials and workmen of the Norton Company and Norton Grinding Company, Worcester, Mass. There were present all the foremen and assistant foremen of both companies, and one workman from each department. C. L. Allen, general manager of the Norton Company, was elected president, and C. H. Norton, chief engineer of the Norton Grinding Company, vice-president. A constitution was adopted and the following standing committees appointed—Membership, Social, Reward, and Nomination. All present signed the charter roll of the association, and the representation of the workmen present will constitute the first group of safety inspectors.

The beginning of safety work in the factory of the Norton Company was in March, 1909, when a safety committee was organized, composed of five members, four being heads of departments and one a member of the engineering department. This committee has made monthly inspections of the plant, with subsequent recommendations. The result has been that practically all dangerous places have been guarded, and it is certain that a great many accidents have been thus prevented. That the work of the safety committee has been thorough is proved by the fact that on investigating the causes of all accidents reported to the Norton Hospital it is very seldom that an accident can now be attributed to the lack of a mechanical safeguard. The safety committees of the two companies will continue this work as in the past, and will enter into the Safety First Association, being designated by the constitution as the executive committee.

A study of the accidents which were happening in the plants of both companies showed that they were almost always due either to avoidable risks or to carelessness. Further study showed that if the accidents caused by carelessness could be eliminated those remaining would be almost insignificant in number. With this in mind the safety committees were called together and after several meetings the following plan of procedure was recommended and has been carried out:

1. To establish a standard for all mechanical safeguards, a book of standard safety specifications was given to all foremen, draftsmen, inspectors and others who have occasion to order machinery of any kind.

2. A book of safety rules for workmen was drawn up and each man who learns the rules to the satisfaction of the committee is made a member of the Safety First Association, and is given an attractive button as an incentive. This society holds social meetings at which discussion of safety topics forms part of the programme, and to which only members wearing buttons are admitted.

3. A set of safety rules for foremen was adopted, which was issued to each foreman and assistants.

4. To assist the foremen in enforcing the safety rules, a safety inspector was appointed in each department, whose duty it is to report any one whom he sees violating the safety rules or any dangerous condition which he observes in his department. These inspectors wear a special button as a badge of authority, and an official notice of their appointment is posted in each department.

To introduce the subject to the men, the words "Safety First" were printed in large letters on the pay envelopes. This got the men to asking what these words meant. After two issues of such pay envelopes, large placards, printed in three languages, were posted in various parts of the works, which gave a short explanation of "Safety First." An announcement of the proposed organization was also published in the monthly Health and Safety Bulletin, issued by the health and sanitation department. No attempt has been made to coerce the men into joining, but their response to the invitation has been prompt.

The Rehmann Revolving Gas Producer*

The most important of all points in the design of a revolving-grate producer is the formation of the grate. This should be designed to penetrate as far up as is safe into the body of the ash and fuel. It should rotate through as great an area as possible, disturbing the maximum of ash, and it should distribute the air and steam equally throughout the whole charge at an equal level. The air and steam ports should be properly protected to prevent any ash or dirt blocking them, and the sides of the grate should be as nearly vertical as possible, so that the ash can fall equally from the center and the outside, and thus retain a level fire zone. Obviously the shallower the grate the more difficult is it for ash to fall, owing to the low angle of the grate surface.

The Rehmann producer as shown in Fig. 1 fulfills these requirements, as there are four separate domes, each with a different revolving center with a high angle and with carefully deep-louvred air ports. The continuous and equal fall of the ash controls not only the output, but also the gas quality, as it is only by keeping the ash constantly moving downward to the basin that the formation and accumulation of clinker is prevented and the output and quality of gas maintained continuously. A form of shallow grate has been specially designed and patented recently for gasifying small dusty coal of mildly caking and clinkering propensities,

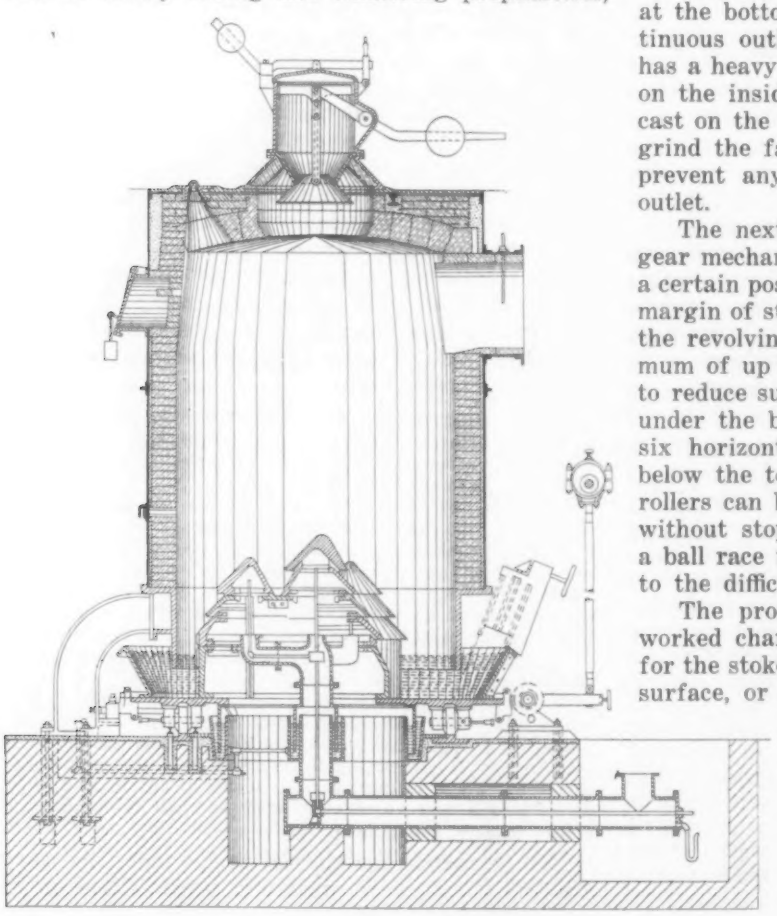


Fig. 1—The Rehmann Producer

which grate retains all the main advantages of the dome grate, such as a high angle of fall for the ash and protected air ports, but does not go so high into the ash. This shallowness prevents the too great disturbance of the burning fuel and prevents waste of carbon contents (see Fig. 4).

*From an article in the Iron and Coal Trades Review, London, England, by John A. Smeeton, Smeeton & Brewer, London, manufacturers of the Rehmann producer.

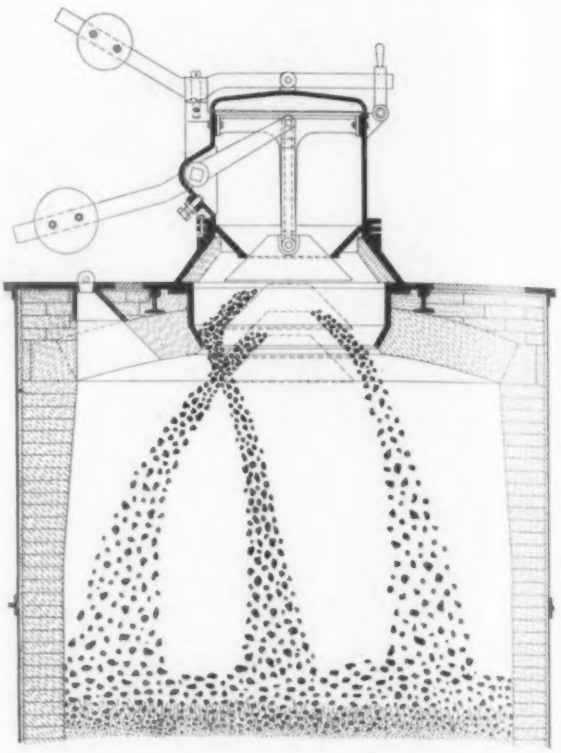


Fig. 2—Hand-Spreading Coal Charger

To prevent the large lumps of clinker gathering at the bottom in the basin and retarding the continuous outlet of the ash, the Rehmann producer has a heavy cast-iron carrying ring with teeth cast on the inside which act in conjunction with teeth cast on the exterior of the grate box. These teeth grind the falling lumps of clinker small, and thus prevent any trouble from clogging at the basin outlet.

The next most important detail is the driving gear mechanism, which should be arranged to give a certain positive movement to the grate and a large margin of strength. Care should also be taken that the revolving basin turns evenly and with a minimum of up and down or eccentric movement so as to reduce such wear. There are six vertical rollers under the basin running on a cast-iron path, and six horizontal rollers running on a turned path below the tooth wheel under the basin. All these rollers can be regulated and, if necessary, replaced without stopping the producer. Some types have a ball race movement; this is not advisable, owing to the difficulty of access for inspection or repair.

The producer carries a simple form of hand-worked charger, Fig. 2, with which it is possible for the stoker to drop his coal evenly over the whole surface, or alternatively to the center or the outside, according to the condition of the fire.

Many producers are built with the gas outlet in a vertical direction from the producer. This is bad design, as it always causes a rush of gas to the outlet and creates a vertical suction which results in the fire immediately below the outlet burning much hotter, and causes blow-holes which, if not attended to, increase the percentage of CO_2; often also it is difficult to poke the fire at these points because of the outlet pipe being in the way. It is advisable, therefore, that the gas outlet should be horizontal and as near the top as possible, to prevent any inequality in the fire surface condition and to enable the stoker to poke the whole surface equally without undue trouble.

At an installation of four 10-ft. Rehmann producers at Vickers, Ltd., Sheffield, each producer has gasified as much as 2700 lb. per hour of good South Yorkshire cobbles with an average over 12 months of 40 per cent. of combustible gases and only 3 per cent of CO^2.

The air pressure varies between 4 in. and 6 in. water-gauge and a 1-in. pipe of dry steam at about 40-lb. pressure, which maintains a gas pressure in the flues varying from 1 in. to 2 in. of water. The power consumed for turning the grates is about $2\frac{1}{2}$ hp. per producer. The ash is, of course, removed automatically by a spade which can be regulated according to the ash content of the coal being gasified. The quality of the gas obtained at an installation at the Cwmfelin Steel & Tin Plate works varies between 38 per cent. and 44 per cent. of combustible gases.

Preliminaries in Establishing Scientific Management

Five points which he regards as preliminaries before scientific management can begin were outlined by Hans Renold of silent chain fame in a paper read some time ago before the Association of Engineers, Manchester, Eng. These points are embraced in the following:

It goes without saying that organizing large works can never be said to be really finished; still a tolerably complete state of organization can be reached in from two to three years, but it must be taken in hand energetically and with spirit. Very often it is well to retain the services of the professional business organizer as a permanent part of the system, and he then makes a visit of one or two days every month. Thus the man who has conceived and worked out the system has an opportunity to see how his work is carried out, and what modifications time and experience may suggest in the different departments. Often from time to time he can make modifications and improvements, which occur to him through working in other manufacturing concerns, although they may be producing widely different articles.

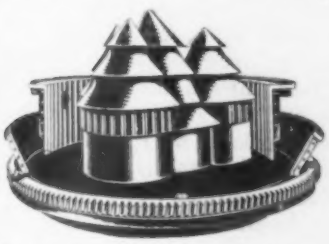


Fig. 3—Dome Grate of Rehmann Producer

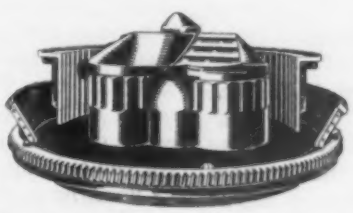


Fig. 4—Shallow Grate of Rehmann Producer

The hundred-and-one small tools and appliances necessary to carry on the diverse operations of an engineering shop should first be studied as to what is their best form and shape for the work to be done, then to standardize and adopt them. Their sizes should be reduced to a reasonable number, and a stock kept ready in the stores to be given out when required. Duplicating is so much cheaper than making single individual tools.

In far too many instances laborers and workmen need more or less training, and to be shown how to go about their work, and how to serve their machines to obtain the greatest efficiency. The manner in which cutting tools should be ground and used, or better still, to make arrangements that all cutting tools are ground by one man only on special grinding machines. Newly ground tools should daily be given out from stores and carried by messenger boys to the machine men, so that there is no need for them ever to leave their machines and waste their own and much more valuable time. A system of electric call bells offers great advantages, and when once installed, will never be given up again.

The best method of fixing a piece of work, and the course to be followed when machining, should be established; also the most suitable machine for the work to be done. The machines should be kept in such a state of repair that they can really perform the work expected from them. Neglected repairs have a twofold bad effect. They curtail production and lower the quality of work, but what is still more important they make the workmen dissatisfied, as they cannot steadily pursue their work, nor earn what is their due.

Speed and feed charts ought to be established for the various machines doing work on pieces differing as to size, structure and material. Attention to the grouping of machinery about the works is of great importance. To obtain the most economical results with least waste of time and efforts, carting of the work to and fro unnecessarily should be avoided.

Where to locate stores and how supplies and work should be given out are very important points and often require not a little study and organization.

Blast-Furnace Gas for Drying Molds

The application of blast-furnace gas to foundries has received increased attention lately, according to a discussion of this topic by D. Neustadter before the Cleveland (England) Institution of Engineers. Attention was called to Dr. Buck's treatise on the subject in which he stated that the utility of this gas in the foundry is accounted for by its very much lower contents of hydrogen and water as compared with coke-oven and producer gas. Coke-oven gas and its mixtures have been shown to be unsuitable for drying long molds because of the collection of water, resulting from combustion, in the upper and colder portions of the molds. Overheating often followed, with cracking of the lower portions and insufficient drying of the upper. Certain kinds of producer gas containing a large amount of hydrogen produced the same results, also depositing tar and soot, while clean blast furnace gas left the pipes clean and burned without a residue. To the smokeless and odorless combustion of highly cleaned blast-furnace gas Dr. Buck attributed a large share of the increased producing capacities of some modern pipe foundries. It permitted work on a revolving pipe-casting frame, and the casting of finished molds while others were being dried at the same time, and even permitted the finishing of the upper portion of molds while the lower portion was already undergoing the drying process. The products of combustion did not harm the workmen.

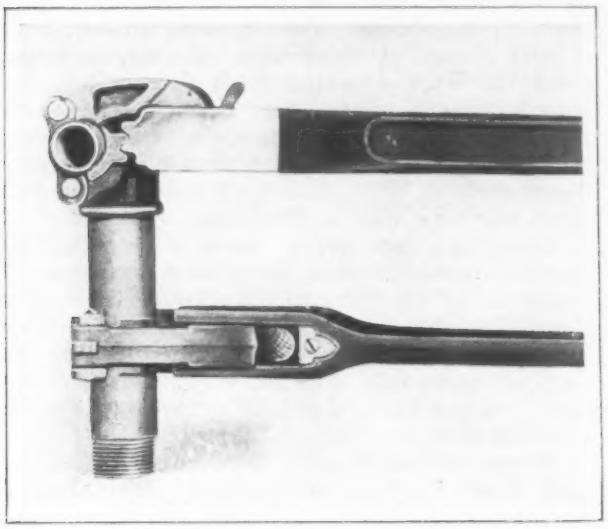
While data as to the savings effected by the use of blast-furnace gas in foundries were difficult to obtain, figures collected at the Halbergerhuette were offered. On account of alterations there some time ago four core ovens usually served by gas had to be coal-fired, offering an opportunity for comparisons. The coal used was low grade with an average calorific value of 7260 B. t. u. per lb. and the four ovens were found to require 6050 lb. of coal per 24 hr. Records on the same ovens gas-fired showed a consumption of 187,000 to 260,000 cu. ft. of gas during the same period. Both systems therefore compared as follows:

Consumption when coal-fired = 6050 x 7260 = 43.8 million B.t.u.
Consumption when gas-fired = 223,500 x 107 = 24 million B.t.u.

Thus with gas-firing only 55 per cent. of the heat was employed as against coal-firing. The latest modern burners would reduce the gas consumption materially.

A New Compression Wrench and Ratchet

The Lutz-Webster Engineering Company, Philadelphia, Pa., has recently brought out a line of compression wrenches and ratchets. Among the uses that may be made of the wrench are direct application to straight shank drills or on the body of the drill itself to hold it when drilling in lathe



A New Compression Ratchet Wrench for General Use on Rough or Finished Round Surfaces

centers; direct application to the shanks of reamers and taps, enabling them to be driven with a ratchet action; for radiator, coil and pipe work; the erection of pipe railings, the manufacture of metal bedsteads and the installation of electric conduits. It is pointed out that the wrench will give a positive continuous movement without marring or slipping, even on greased surfaces, and can be applied directly over the threads of short and close nipples. Where wrenches are to be used exclusively for polished brass or nickel pipe special leather lined girths are furnished.

Electric furnace steel castings are used for the handles, and the girths are drop forgings of 0.45 to 0.50 per cent. carbon open-hearth steel. The hinge rivets are turned from bar stock and are held in the girth by spinning the girth into a slight groove cut in the end of the rivet. The locking device consists of the thumb latch and two clamping pieces, between which are placed two flat springs that are compressed on the latch by the clamps. The tension of the springs can be varied from nothing to a complete binding of the thumb latch by a screw through the clamping pieces. If a spring should break it is emphasized that the clamping pieces may be used in the usual manner, except that there will not be quite as much flexibility.

The ratchets are made of steel and the center point and knock-out for the drill inside the screw are of hardened tool steel. These parts are pressed into place and can be removed and replaced if desired. One of the advantages of the ratchet is that with the handle and girth removed it is a straight-line tool. Another point that is especially emphasized in connection with the ratchet is that there are no springs, pawls, teeth, etc., to break or get out of order. It is pointed out that in ratchets having teeth and pawls it is necessary to move the handle the full amount of a tooth or a number of teeth each stroke, and any movement short of that required to catch the next tooth is lost and wasted. The Lutz ratchet is reversible and less than an inch of movement of the end of the handle is enough to operate it.

A NEW LINE OF SCREW PLATES

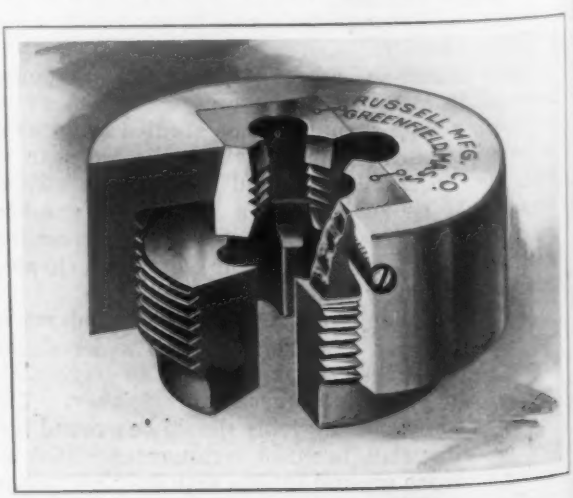
The Russell Mfg. Company's Product Containing the Double Die Feature

The Russell Mfg. Company, which recently organized and established a fully equipped factory for the manufacture of screw plates at Greenfield, Mass., embodies in its product a number of new features which are of interest to users of this class of tools. An important innovation is the use of dies made to cut from both faces, known as double dies. When a thread is to be cut close up to a shoulder, or a very short piece is to be threaded, the cut is made from the front face of the die. Thus the space which cannot be reached when cutting from the guide side of the die, represented by the thickness of the guide, can be threaded clear up to the workholder or the shoulder. It is not necessary to start the thread from the guide side. If a little care is taken in holding the die true in starting, a perfect thread can be cut without the guide. The life of the die is lengthened, because when one side is worn the other face can be used, bringing into action a new set of cutting edges.

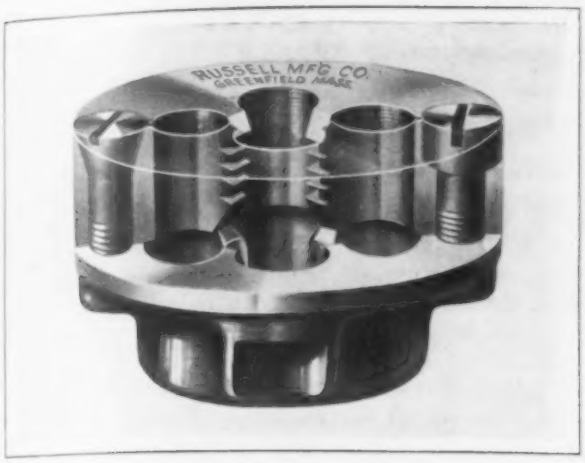
In the style B screw plate, the screw guide below forces the beveled edges of the die snugly against the beveled surfaces of the collet. These beveled surfaces being identical in form, a combined screw and taper fit is effected, positive and rigid, and constantly correcting itself as a compensation for wear. The adjustment of the cutting size for tight or loose fits of bolts and nuts is accomplished by turning the screws located back of the die halves in or out.

The style B form of die has been adapted by the Russell Company in the opening die screw plate, which is an unusually important improvement, as lending itself for cutting bolts by hand. The dies are opened and closed by a simple movement of a lever located on the side of the stock. When a thread has been cut to the required length the operator pushes the lever, which throws the dies open and clear of the thread and the whole tool is easily lifted off the finished work. The reversing of the lever motion closes the dies exactly to size, ready for the cutting of another thread. The time wasted by running back over the finished thread, about one-third, is saved; the marring or stripping of the thread caused by chips crowding into the die teeth while turning back, is avoided, and wear is very materially reduced.

The type A screw plate is very simple of adjustment, this being accomplished by a single screw while the die is in the stock ready for use. The



The Style B Screw Plate



The Style A Screw Plate

cup-headed screw at the right holds the halves firmly together, acting as a hinge, while the size is regulated by the taper-headed screw at the left, the whole being clamped rigidly intc the elastic stock.

In the full mounted screw plate the adjusting of the die for wear or to make a tight or a loose fit for nuts and bolts is accomplished by loosening the outside binding screws, adjusting the taper-headed screws to fit the required size, and finally setting all screws tight. When properly adjusted the taper-headed screws are flush with or below the face of the die.

A New Semi-Indirect Lighting Fixture

A new fixture embodying the luminous bowl principle has been placed on the market by the National X-Ray Reflector Company, Chicago, Ill. The construction of this fixture is brought out in the accompanying drawing. A one-piece silvered glass reflector directs the light from the lamp to the ceiling, from which it is diffused throughout the room. The small amount of light which comes through the opening in the bottom of the reflector is redirected by an opal glass diffuser, and it is emphasized that this illuminates the glass bowl evenly and softly for decorative effects. It is pointed out that no useful light reaches the working plane directly through the glass bowl. The glass bowl is softly lighted so that the eye can look directly at it without discomfort and the delicate coloring and designs of the glass are also enhanced by this method.

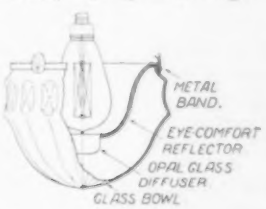


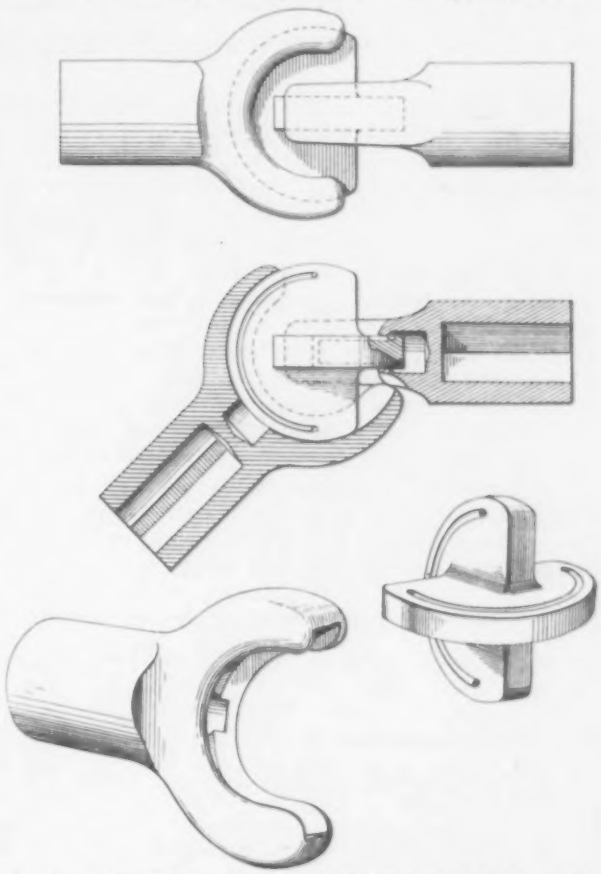
Diagram Showing the Construction of a Recently Developed Fixture for Use in Semi-Indirect Lighting Employing the Luminous Bowl Principle

With the exception of a narrow metal band the bowl is made entirely of glass. The fixture is, however, as truly indirect as though the bowl was made of metal, composition or wood. The reflector used in this fixture is the same type as that employed in single unit opaque bowls of the same capacity.

A black rust-proof finish can be put on iron or steel according to a patent (1,069,903) granted to F. Richards, Coventry, England. It can even be put on hardened steel because of the low temperature at which it can be applied. The iron or steel articles, previously cleaned, are placed in a solution of 120 gal. of water, 3 lb. of manganese dioxide and ½ lb. of concentrated phosphoric acid, heated to the boiling point in a suitable receptacle. After being in the solution for 30 to 90 minutes they are removed, wiped and oiled with linseed oil.

Three-Piece Universal Joint for Shafts

For use on milling machines, multiple-spindle drilling machines, automobiles and general purposes where a universal joint is required, the Plank Flexible Shaft Machine Company, Grand Rapids, Mich., has developed a three-piece universal joint. The construction is simple and comprises only three pieces, there being no bolts, pins or other complicated parts used throughout its construction. The joint can be disengaged at two points only and before it can be taken apart, the forks have to be at an angle of 45 deg. from parallel lines. It is emphasized that the joint has a large amount of wearing stock.



A New Three-Piece Universal Joint for Shafting Assembled and Separated Into Its Component Parts

Cast-Iron Crane Wheels

Common practice has come to accept an all-steel or steel-tired wheel as the best suited for crane service. Makers of cast-iron wheels have for some time been attempting to demonstrate the practicability and fitness of the cast-iron wheel for the same duty. The Griffin Wheel Company now has designed and is marketing a type of crane wheel which has shown excellent results under test. Loads in the form of a continuous side thrust on the flanges of this wheel show an average breaking strength of 600,000 lb. and a maximum breaking strength under continuous load approximating 1,000,000 lb. Accuracy in securing a uniform tread circumference for all of the crane wheels is easily secured, it is maintained, by the ordinary processes of grinding.

Briquetting by means of pressure in the presence of steam is the subject of a United States patent (1,087,183—February 17, 1914) granted to Arpad Ronay, of Berlin, Germany. The essential feature is that hot steam is introduced into the mass of particles just previous to the pressing. The process may be applied to flue dust, ores, coal dust, etc. Oxidation of the particles is claimed to be accomplished uniformly and quickly at the high temperature of the operation.

The Metal Working Industries of Worcester

Points of Interest in Connection with Next Week's Conventions of the National Metal Trades and Machine Tool Builders' Associations

The conventions of the National Metal Trades Association and the National Machine Tool Builders' Association, to be held next week at the Hotel Bancroft, Worcester, Mass., will afford a great number of manufacturers from all over the United States the opportunity to look over a typical New England manufacturing city, which is famous for the wide diversity of its products. The accompanying map of Worcester indicates the location of some 50 works, all of them either manufacturers of machinery and other metal lines, or closely allied with them. The names of many of them are known everywhere. This is true also of other Worcester plants producing staples and specialties, which are not indicated on the map because of the confusion which would result from too liberal a representation. These include various important works that build textile machinery, also textile mills, among them the Whittall carpet mills, one of the largest in the world. A corset factory of great size and large envelope factories are other places of interest.

THE CONVENTION PROGRAMMES

The programmes of the conventions will be carried out, as outlined in *The Iron Age* last week. Monday, Tuesday and Wednesday will be devoted to the Metal Trades meetings, and Thursday and Friday to those of the Machine Tool Builders. The time at the latter will be given up largely to sectional or group meetings, according to products. As there are many members in common the attendance will be somewhat identical in its representation. The manufacturers of the city who, because of the nature of their product, are not identified with either association are taking a keen interest in the occasion, and their hospitality will assist in making the week a pleasant one for the visitors.

The programme of entertainment in connection with the Metal Trades convention follows in full:

ENTERTAINMENT FOR DELEGATES

Monday, April 20

11 a. m.—Leave the Bancroft for visit to Trade School for Boys.
12.30 p. m.—Return to Bancroft.
2 p. m.—Leave Bancroft in automobiles for visit to Crompton & Knowles Loom Works and Worcester Polytechnic Institute.
7 p. m.—Dinner for men in Bancroft—entertainment in charge of E. P. Crerie and Dr. A. J. Harpin.

Tuesday, April 21

9 a. m.—One party will leave the Bancroft for South Works, American Steel & Wire Company. Another party will leave Bancroft for shops of Norton Grinding Company, Norton Company, Worcester Pressed Steel Company, Heald Machine Company, and Bradley Car Works.
1 p. m.—Lunch at Bancroft.
2 p. m.—Convention opens.
7 p. m.—Reception—Dinner—Dance.

Wednesday, April 22

9 a. m.—Convention.
2 p. m.—Convention.
7 p. m.—Convention Banquet.

Programme of the National Metal Trades Association Convention

TUESDAY, APRIL 21, 1914

Buffet Luncheon, One o'Clock

Call to order at 2 o'clock.
Address of welcome, by Hon. George M. Wright, Mayor of Worcester.
Roll call.
Reading of minutes.
Appointment of convention committees:
- Credentials
- Resolutions
- Constitution
- Auditing
- Convention

Reports of officers:
- W. A. Layman, President.
- F. C. Caldwell, Treasurer.
- John D. Hibbard, Commissioner.
- Homer D. Sayre, Secretary.

Reports of standing committees:
- (a) Industrial Education, F. A. Geier, Chairman.
- Discussion by C. A. Prosser, National Society for Promotion of Industrial Education, New York City.
- Louis H. Buckley and George I. Alden, Worcester Independent Industrial Schools.
- W. B. Hunter, Fitchburg Plan of Industrial Education.
- General discussion.
- (b) Prevention of Industrial Accidents, W. H. Van Dervoort, Chairman.
- Discussion by Wm. H. Doolittle, National Metal Trades Association's Safety Inspector.
- M. W. Alexander, Chairman Committee on Safety and Sanitation, National Founders' Association.
- General discussion.
- (c) Publicity, Justus H. Schwacke, Chairman.

New business.

WEDNESDAY, APRIL 22, 1914

Morning Session at 9:30

"Results of Applied Scientific Management," George D. Babcock, H. H. Franklin Manufacturing Company, Syracuse, N. Y.
General discussion.
"Basic Principles of Industrial Organization," Dexter S. Kimball, Sibley College, Cornell University, Ithaca, N. Y.
General discussion.
"Work of the Bureau of Foreign and Domestic Commerce and the Plans of the Department for Its Development," Albertus H. Baldwin, Chief of Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C.
General discussion.
Adjournment.

RECESS

Afternoon Session at 2.

"Labor Legislation," Walter Gordon Merritt, American Anti-Boycott Association, New York City.
Discussion by B. B. Tuttle, Cincinnati, Ohio.
General discussion.
Reports of Convention Committees.
Report of Nominating Committee, Justus H. Schwacke, Chairman.
Election of officers.
Installation of officers.
Adjournment.

Evening, 7 o'clock, convention banquet, Hotel Bancroft.

ENTERTAINMENT FOR THE LADIES

Monday, April 20

12 noon—Ladies will leave the Bancroft for trip in automobiles to Brigham Hill, a fine New England tea house, erected in 1728, where lunch will be served. Leave Brigham Hill at 2.15 p. m., for a ride to the Metropolitan Reservoir at Clinton; thence to the home of Mary Sawyer, at Sterling, whose lamb followed her to school. Arrive at the Bancroft at 5 p. m., in time to prepare for theatre party at 8 p. m., to witness "The Sunshine Girl," with wives of Worcester Executive Board.

Tuesday, April 21

10 a. m.—Ladies leave from Bancroft in automobiles for trip to Woman's Club, Worcester Art Museum, Royal Worcester Corset Company's shop, where lunch will be served. Then automobile ride to Spencer and around Lake Quinsigamond. Return to the Bancroft in time to prepare for reception, dinner, dance.
7 p. m.—Reception, dinner, dance in Bancroft ballroom.

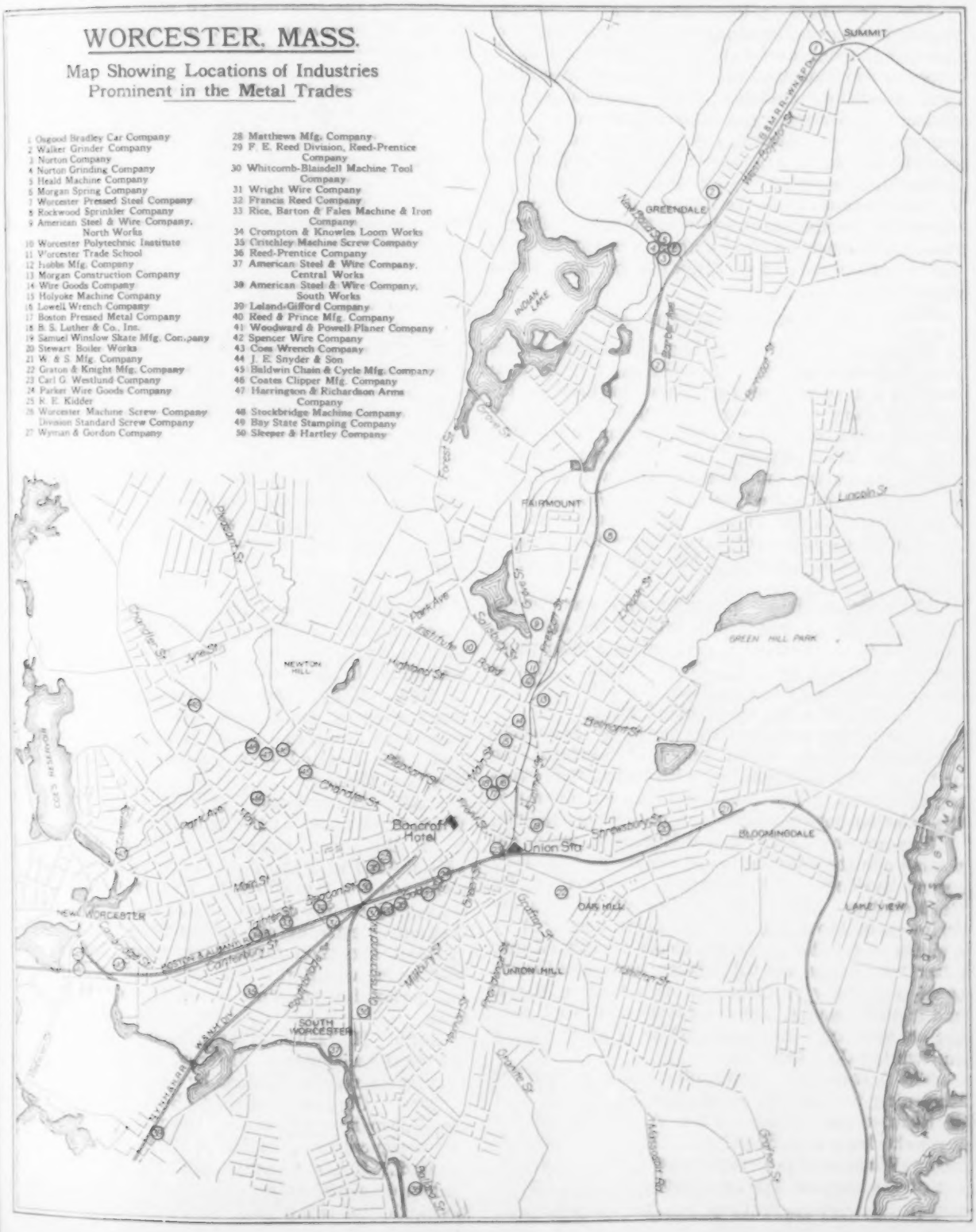
Wednesday, April 22

10 a. m.—Ladies leave Bancroft in automobiles to visit Girls' and Boys' Trade Schools, thence to Tatnuck Country Club for lunch at 12.30 p. m., after which golf or cards can be indulged in during afternoon. Arrive at Bancroft at 5 p. m., in time to prepare for dinner at 6.30, with wives of Executive Board members. At 9 p. m. adjourn to mezzanine floor to listen to music and addresses at men's banquet.

Preliminary to the Tuesday and Wednesday meetings of the National Metal Trades Association, for which the full programme is printed herewith, the Executive Committee of the association meets at the Babcock Monday morning at 9 o'clock. At 2 p. m. comes the Administrative Council meeting, and at 7 p. m. the alumni dinner. The secretaries' breakfast is set for 8 a. m. on Tuesday, and at 10 a. m. Tuesday a joint meeting will be held of the local presidents, secretaries and the Administrative Council.

The time of the members of the National Machine Tool Builders' Association will be pretty fully occupied with the general sessions and the meetings of the various committees. Friday noon the Norton Company will entertain the members at luncheon at the works at Greendale, and opportunity to inspect other plants will be afforded. Thursday evening comes the dinner given to the visitors by the Worcester manufacturers. The ladies will be given automobile rides and will be entertained at luncheon, and they also will be guests at the Thursday evening dinner, where tables will be reserved for them in the gallery of the Bancroft ball room.

Graphic methods for keeping corporation operating records in convenient form for instantaneous reference by executive officers are to be discussed in a series of three lectures to be given by Willard C. Brinton, consulting engineer, New York, before the University of Chicago, on the afternoons of April 27, 28 and 29, and before the School of Commerce, Northwestern University, Chicago, on the evenings of the same days.


WORCESTER, MASS.
Map Showing Locations of Industries Prominent in the Metal Trades
1 Osgood Bradley Car Company
2 Walker Grinder Company
3 Norton Company
4 Norton Grinding Company
5 Heald Machine Company
6 Morgan Spring Company
7 Worcester Pressed Steel Company
8 Rockwood Sprinkler Company
9 American Steel & Wire Company, North Works
10 Worcester Polytechnic Institute
11 Worcester Trade School
12 Hobbs Mfg. Company
13 Morgan Construction Company
14 Wire Goods Company
15 Holyoke Machine Company
16 Lowell Wrench Company
17 Boston Pressed Metal Company
18 B. S. Luther & Co., Inc.
19 Samuel Winslow Skate Mfg. Company
20 Stewart Boiler Works
21 W. & S. Mfg. Company
22 Graton & Knight Mfg. Company
23 Carl G. Westlund Company
24 Parker Wire Goods Company
25 K. E. Kidder
26 Worcester Machine Screw Company
Division Standard Screw Company
27 Wyman & Gordon Company
28 Matthews Mfg. Company
29 F. E. Reed Division, Reed-Prentice Company
30 Whitcomb-Blaisdell Machine Tool Company
31 Wright Wire Company
32 Francis Reed Company
33 Rice, Barton & Fales Machine & Iron Company
34 Crompton & Knowles Loom Works
35 Critchley Machine Screw Company
36 Reed-Prentice Company
37 American Steel & Wire Company, Central Works
38 American Steel & Wire Company, South Works
39 Leland-Gifford Company
40 Reed & Prince Mfg. Company
41 Woodward & Powell Planer Company
42 Spencer Wire Company
43 Coes Wrench Company
44 J. E. Snyder & Son
45 Baldwin Chain & Cycle Mfg. Company
46 Coates Clipper Mfg. Company
47 Harrington & Richardson Arms Company
48 Stockbridge Machine Company
49 Bay State Stamping Company
50 Sleeper & Hartley Company
SUMMIT
GREENDALE
INDIAN LAKE
FAIRMOUNT
GREEN HILL PARK
NEWTON HILL
Bancroft Hotel
Union Sta
BLOOMINGDALE
OAK HILL
LAKE VIEW
UNION HILL
SOUTH WORCESTER
NEW WORCESTER

The Heat Treatment of Carbon Steel*

Iron-Carbon Combinations and Their Relation to the Phenomena of Heating and Cooling—Effects of Mass and Rate of Cooling.

BY HUGH P. TIEMANN†

In the present paper I have considered only pure carbon steel; that is, the alloys of iron with carbon. The principles involved are practically the same as when other elements are present, and certain exceptions are thus avoided which serve chiefly to render the subject more difficult of comprehension.

Heat treatment in its most general sense may be taken to mean the application of heat either to make the metal easier to work by rendering it softer or more ductile, or to secure certain desired (and beneficial) changes in its constitution and physical properties without mechanical work. By common usage, however, the term has become restricted to the latter application, for which the writer has suggested the following definition:

Heat treatment is the change, or the series of changes, in temperature, and also the rate of change from one temperature to another, brought about to secure certain desired conditions or properties in a metal or alloy.

TEMPERING AN ANCIENT ART

Heat treatment, like custom or common usage, goes back to the time "when the memory of man runneth not to the contrary," and we have no recorded history of its origin. Probably one of the earliest references to hardening by quenching occurs in the "Odyssey" in the passage where Ulysses, narrating the blinding of Polyphemus, the cyclops, with the heated stake, says: "And as when a smith dips an axe or adze in chill water with a great hissing—for hereby anon comes the strength of iron—even so did his eye hiss round the stake of olive."

The peculiar virtues of certain waters as quenching media *per se* was firmly held by the ancients, probably due to their unvarying coldness throughout the year, which insured uniform results. This is illustrated by a quotation from "Othello": "It is a sword of Spain, the ice-brook's temper."

Pliny mentions that oil was employed for quenching small objects which would be rendered too brittle by similar treatment with water, thus proving that even in his time something was known of the relation between mass and quenching medium.

The present theory of heat treatment, which depends upon the constitution of the metal, is of very recent development. For example, in Agricola's "De Re Metallica" (first Latin edition of 1556) a description of the method of hardening employed by a smith states that after the pieces are shaped into a bar "while they are still glowing, he at once throws them into the very coldest nearby running water, and in this manner, being suddenly condensed, they are changed into pure steel, which is much harder and whiter than iron."

The first definite theory advanced to explain the hardening and tempering of steel is probably that of Réaumur in his book "The Art of Converting Wrought Iron Into Steel" (1722). This is as follows: When steel is heated, certain salts are driven out of the metallic grains or molecules and form a cement between them which, by rapid cooling, is prevented from reëntering them. Reheating to moderate temperatures permits the absorption of a certain amount of the salt with consequent decrease in hardness. As a result of heating in a Torricellian vacuum he draws the conclusion which expresses the modern opinion: "The hardening of steel being due neither to the intervention of some new substance nor to the expulsion of air, the cause can be sought only in the changes which the structure undergoes."

DEVELOPMENT OF HEAT TREATMENT LITERATURE

Coming down to recent times the following are briefly the principal events, in their chronological order, which are responsible for our present knowledge of the subject:

1864. Sorby (British Assoc.) published his work on the microscopic examination of iron and steel, which he had commenced the preceding year. This did not bear any fruit until after 1887, in which year he read, by request, a paper on the subject before the Iron and Steel Institute.

1869. Gore (Proc. Roy. Soc.) published the results of his experiments on the dilatation of steel at high temperatures. The method employed was a wire stretched horizontally which, by means of a series of levers, indicated the amount of expansion or contraction during heating or cooling. At a dark red, he found on cooling a greater dilatation than immediately above or below that temperature. He call this phenomenon recalescence, because of the momentary brightening which accompanied it. He did not, however, observe the reverse effect during heating.

1873. Barrett (Phil. Mag.) carefully checked the work of Gore and found the reverse effect occurred during heating at nearly the same temperature as during cooling. He noted that this point was slight in the case of soft steels.

1880. Hogg stated that quenched steel showed less carbon by the Eggertz color method than the same steel annealed. About this time iron carbide, Fe_3C, was isolated from annealed steel by Weyl, Abel and Mueller.

1885. Osmond and Werth (Ann. d. Mines) published their paper on the cellular theory of steel.

In the years immediately following Osmond (Mem. Artil. et Mar.) gave the results of his experiments on the transformation of iron and carbon, employing cooling curves obtained by means of a Le Chatelier electrothermic pyrometer.

1886. Pionchon made experiments on the specific heats at different temperatures, certain seeming anomalies pointing to allotropic transformations.

1890. H. Le Chatelier published variations in electrical resistance at different temperatures, confirming the results obtained by other methods.

1895. Osmond published (Bull. Soc. d'Enc.) his classical monograph on the "General Method for the Microscopical Examination of Carbon Steels."

1899. Roberts-Austen plotted the first iron-carbon diagram, corrected and amplified by Roozeboom, the following year, on the basis of the phase rule.

* A paper read before the Technology Club of Syracuse, N. Y., March 31, 1914.

†Metallurgist Carnegie Steel Company, Pittsburgh.

Other experimenters and scientists to whom particular tribute must be paid are Howe, Sauveur and Arnold.

THEORY OF HEAT TREATMENT CHANGES

The explanation of the various changes brought about by various heat treatments is based on the accepted theory that the element iron under proper conditions is capable of three, or at least two, allotropic modifications whereby certain of its properties differ considerably. To illustrate this it will be sufficient to cite the case of steel of a grade suitable for hardening. This can be effected by rapid cooling (usually quenching) only when heated above a certain definite temperature. At any lower temperature, no matter how rapid the cooling, it will remain soft. This is due to an allotropic modification existing above the given temperature which, by the rapid cooling, is preserved either partially or wholly in the cold state. If this were not so, the hardness should increase gradually when cooled from progressively higher temperatures, and not suddenly when a certain temperature has been passed.

In order to understand how heat treatment can produce such changes, the results of which in practically every case are shown by the properties of the material when cold, it is necessary to consider how steel is constituted or made up under different conditions of treatment or composition. We therefore have the physical constitution varying either with or without changes in the chemical composition.

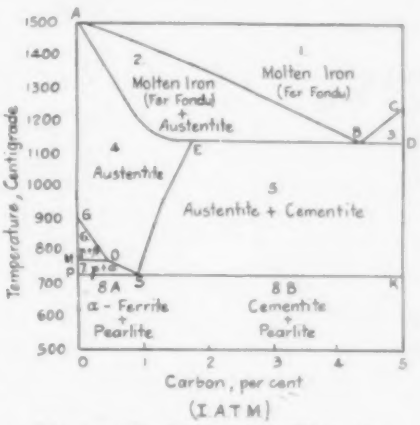


Fig. 1—The Iron-Carbon Diagram

IRON-CARBON COMBINATIONS

Iron as an element is at present only a metallurgical curiosity, as its cost is very high. Also its practical application is relatively limited in comparison with that of its combinations which are capable of widely varying properties for all manner of purposes. Such a combination is commonly known as an alloy, even where the other constituents or ingredients are not metallic in character. The most important element to combine with iron is carbon, the resultant substance (with carbon up to about 2 per cent.) being termed steel. This element has a wider effect on iron than any other, and even when special elements such as chrome, nickel, vanadium, etc., are introduced its influence still predominates or governs those of the others.

It must not be supposed that the combination of iron and carbon is homogeneous throughout, that is, of uniform composition and texture, for this is far from being the case except under special conditions, for example, in the molten state or when at a high temperature. This condition is not due to segregation as ordinarily understood, but to certain phenomena which are peculiar to most alloys.

THE SOLUTION THEORY

As the iron-carbon alloys present certain complications, it will be simpler to approach the subject by a study of what occurs when solutions containing different proportions of water and salt are cooled. If pure water is cooled, its temperature falls regularly until 0 deg. C is reached, when freezing occurs, the temperature remaining constant until all the water has frozen, after which the fall of temperature proceeds regularly. If a solution containing a small percentage of salt, say about 2 per cent., is cooled, freezing does not take place until a temperature below 0 deg. C has been reached, when, however, the entire solution does not freeze. Instead, small portions of nearly pure ice are gradually formed as the temperature is progressively reduced, the remaining solution, in consequence, becoming richer and richer in salt. This separation of ice is known as "selective freezing." Finally at — 22 deg. C the temperature remains stationary until the remaining solution or "mother liquor," which now contains 23.6 per cent. of salt, has completely solidified. This last freezing substance consists, not of crystals of salt dissolved in ice, but of separate, intimately mixed, microscopic plates of ice and salt. Such a mixture is termed a "eutectic" or "cryohydrate."

With a higher percentage of salt, say about 10 per cent., cooling proceeds to a somewhat lower temperature than in the preceding case before ice commences to separate out; but the final freezing point and the composition of the mother liquor are again —22 deg. C. and 23.6 per cent. of salt, respectively, there being of course proportionately more mother liquor. If the solution contains exactly this percentage of salt, cooling proceeds without any separation of ice until —22 deg. C. is reached, when the entire solution freezes out at this temperature. If more than 23.6 per cent. of salt is in the original solution, then salt, instead of ice, separates out initially, so that at —22 deg. C. this composition is reached. It will thus be seen that no matter what the initial percentage of salt, the final composition at —22 deg. C. is always the same.

Where retardations in the rate of cooling occur, due to freezing of part or all of the constituents, the respective temperatures are termed "critical" points or temperatures. If a retardation in the rate of cooling during a given range in temperature is observed, the designation "critical range" is employed.

A curve for a given composition, plotted to show the rate of cooling, is termed a "cooling curve"; a curve comprising the different critical points for a series of different compositions is known as a "freezing point curve.

CHANGES AFTER SOLIDIFICATION

As the important changes in the constitution of steel, and those which heat treatment is called upon to effect, occur after the metal has solidified (regions 5 to 8 inclusive, Fig. 1), it will not be necessary to consider here how it arrives in this condition, as the subject can be studied in treatises on metallography, where also the names and descriptions of the different constituents will be found.

It may at first be somewhat difficult to grasp the idea of changes occurring in solid material, but a little thought will show that the principal difference between a solid and a liquid is in the degree of mobility of the particles or molecules, as there is no sharp division. From water, as one extreme, whose particles are highly mobile, to a heavy oil, then, say, to molasses, then to highly heated steel which is readily forged and rolled, and finally to the same metal when cold (which can still be worked to a considerable extent, as in the case of wire drawing) as the other extreme, the steps are relatively

gradual. We therefore properly speak of a "solid solution," in which the degree of viscosity is high, as similar to a liquid solution, such as the salt and water already discussed, in which the particles have great freedom of movement.

THE IRON-CARBON DIAGRAM

Fig. 1 is known as the "iron-carbon diagram," and is based on the work of various investigators beginning with Roberts-Austen and Roozeboom. It shows, according to the most recent information, the normal conditions which various iron-carbon alloys assume at different temperatures, as indicated by the different areas, the boundary lines showing critical temperatures in passing above or below which transformations (changes in condition) occur. These transformations are not instantaneous but require a certain amount of time for their completion owing to the lag or inertia (molecular viscosity) of the metal. Even with very slow changes of temperature on heating or cooling a certain amount of lag is always present, being more marked when considerable amounts of carbon are present, and for this reason the position of the lines must be slightly lowered if cooling phenomena are being considered, and similarly raised (but to a less extent) for the reverse changes on heating.

The various conditions in which iron-carbon alloys may exist, depending upon the temperature and the percentage of carbon, constitute what are really different substances possessed of different properties and characteristics. To distinguish them names have been given, based largely on methods of nomenclature employed for mineralogical or chemical compounds. These names, with the definitions and descriptions most recently adopted by a committee of the International Association for Testing Materials, will be found in the Proceedings for 1912, also reprinted in a number of technical books and periodicals. For the present purpose it will be sufficient to consider only that portion of the diagram comprising carbon up to about 1 per cent. and for temperatures not exceeding, say, 1100 to 1200 deg. C.

ALPHA, BETA AND GAMMA IRONS

The element iron has the peculiarity of possessing different properties which are normal in different ranges of temperature, a phenomena known as allotropy. Three allotropic varieties or modifications are generally recognized. (See Fig. 1.)

Alpha iron, which is normal below M O S; *beta iron*, which is normal in the area G O M for steel with carbon up to about 0.35 per cent.; and *gamma iron*, which is normal above P S.

Gamma iron can dissolve carbon (as a solid solution) up to about 1.7 per cent.; is intermediate in hardness between beta and alpha iron; is non-magnetic. *Beta iron* (whose existence is still in dispute) can probably dissolve some carbon; is very hard; is weakly magnetic. *Alpha iron* can dissolve little if any carbon; is soft; and is strongly magnetic.

If pure iron (ferrite) is cooled from, say 1200 deg. C., where it exists as gamma iron, the rate of cooling is regular until the point G on the line G O S is reached, when a retardation (Ar_3) occurs, due to the transformation from the gamma to the beta condition. The rate is then regular until the point M on the line M O is reached, when a second retardation (Ar_2) is observed from the transformation into alpha iron. With pure iron only there is no retardation at the line P S, the rate of cooling becoming regular after passing M.

If there is a small percentage of carbon, say 0.20 per cent., a somewhat different state of affairs is found at high temperatures. This carbon, either as such or in the form of carbide of iron (Fe_3C), is in solid solution in gamma iron, which is normal at this temperature, this solid solution being termed *austenite*. When the temperature passes the line G O (Ar_3), free iron in the beta condition is progressively expelled from the solid solution until the line M O (Ar_2) is reached. This beta iron is then transformed into the alpha condition, the expulsion of free iron (also in the alpha condition) continuing until the line P S (Ar_1) is reached. At this point the austenite has been decreased in amount to such an extent that its carbon content has reached the eutectoid percentage (about 0.85 per cent.), that is, what is contained in pearlite. After passing this line (temperature) this remaining austenite is transformed into pearlite, the gamma iron having been changed into alpha iron, whereby the carbon in solution is thrown out as carbide of iron (cementite). The final result is consequently pearlite and free ferrite.

With, say, 0.50 per cent. carbon the same phenomena occur, except that there are only two transformation points, the two upper points previously found being now merged in one (Ar_{23}) when the line O S is reached. Also there is no formation of beta iron, the excess iron separating out in the alpha condition between the line O S and P S until, when P S (Ar_1) is reached, the remaining austenite has the eutectoid percentage of carbon as before.

With about 0.85 per cent. to 0.90 per cent. carbon there is only one transformation point at S (Ar_{123}), as in this case there is no need to separate any iron from the austenite to bring it to the eutectoid composition.

With higher carbons, when the line S E is reached, there is a separation of cementite (instead of iron) until at the line S K the austenite is again of eutectoid composition. Below this line the normal constitution of the metal is pearlite and free cementite.

DISTRIBUTION OF CARBON

It has already been mentioned that carbon is the element which governs or controls the physical properties more than any other. This effect appears to be due to:

1. Its condition.
2. Its distribution.

The condition of the carbon may be in solution in gamma iron, or else in combination with iron as the carbide, if the rest of the iron is in the alpha state. If the carbon is in solution it must be completely diffused or merged in the iron in the same way that salt is diffused when dissolved in water, forming one homogeneous substance in which individual particles cannot be detected even by the aid of the most powerful microscope.

If this solid solution of iron and carbon is preserved when cold by sufficiently rapid cooling, the complete diffusion must also be preserved.

By reheating to temperatures inferior to Ac_1 the restraint of the atoms is sufficiently removed to permit the transformation of some or all of the gamma iron into alpha iron. The carbon originally in solution in this portion is thereby automatically expelled as cementite, resulting in the formation of pearlite. Unless the temperature is close to Ac_1 there is still too much viscosity to permit the molecules sufficient freedom of movement to cause any marked segregation of the ferrite and cementite, so the pearlite has an extremely fine structure. Where temperature and time of cooling are sufficient the formation of relatively coarse pearlite will occur.

The segregation just referred to is not what is commonly understood by the term, and which is detected by ordinary methods of chemical analysis, but only in a microscopical sense.

In actual practice it is well known that of two similar pieces of the same steel, one merely annealed while the other is quenched and then reheated below Ac_1, the latter will possess considerably better physical properties, not only as regards strength, but ductility as well. The cause for this is clearly found in distribution of the carbon, that is, the material is microscopically more homogeneous.

GRAIN SIZE—THERMAL REFINING

Metals and alloys are composed of a number of crystals or grains. The irregularity of their form is due to the fact that the growth of each is interfered with by that of the others surrounding it. Therefore, it is only under special conditions that perfect crystals are attained. The size of these grains depends upon the maximum temperature above Ac_1 at which they have been free to develop, subject to the following conditions:

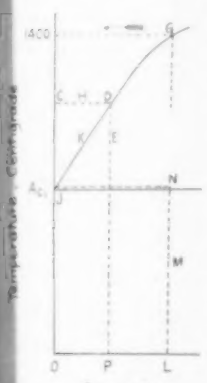


Fig. 2

If a piece of steel is heated to a temperature corresponding to the point G in Fig. 2 (due to Howe), and is then cooled, it will be found to have a grain size O L proportional to this temperature. If it is then reheated the grain size will remain the same until Ac_1 has been reached. Immediately on passing this (as at N), the grain is refined to the minimum, that is, from N to J. If the temperature is still further raised the grain size increases progressively as shown by the curve J D G, and this cycle of changes can be repeated indefinitely, provided the steel is allowed to cool uninterruptedly from the maximum temperature above Ac_1.

Metcalf's Experiment

An experiment to show the effect of temperature on the grain size, known as "Metcalf's Experiment," illustrates this very clearly. A description of this experiment was published by William Metcalf in the Metallurgical Review (Vol. I, No. 3, November, 1877), and because of its value as well as the historical interest attaching to it, the following extensive extract is given:

To show this effect we take a bar of steel of ordinary size, say about inch by half, heat six or eight inches of one end to a low red heat, and nick the heated part all around the bar at intervals of half to three-quarters of an inch, until eight or nine notches are cut. This nicking is done at a red heat to determine the fracture at the nicks. Then place the end of the bar in a very hot fire, leaving the balance of the bar so much out of the fire as to heat it chiefly by conduction. Heat the end of the bar in the fire to white heat, or until it scintillates, and allow it to remain until the nick furthest from the end in the fire is not quite red, and the next barely red. Now, if the pieces be numbered from one to eight, beginning at the outer end:

No. 1 will be white or scintillating;
No. 2 will be white;
No. 3 will be high yellow;
No. 4 will be yellow or orange;
No. 5 will be high red;
No. 6 will be red;
No. 7 will be low red;
No. 8 will be black.

As soon as heated as above described, let the bar be quenched in cold water, and kept in the water until quite cold. After cooling, the bar should be carefully wiped dry, especially in the notches. An examination of the different parts by the file will show the following, if high (carbon) steel has been used:

No. 1 will scratch glass;
Nos. 2, 3, 4 will be excessively hard;
Nos. 5, 6 will be well hardened;
No. 7 about hard enough for tap teeth;
No. 8 not hardened.

In breaking off the pieces, which should be done over the corner of an anvil and the pieces caught in a clean keg or box to keep the fractures clean and bright, it will be found that:

No. 1 will be as brittle as glass;
No. 2 will be nearly as brittle;
Nos. 3, 4, 5 will break off easily, each a little stronger than the other;
Nos. 6, 7 will be very strong, and much stronger than No. 8, or the bar unhardened.

Place the pieces in the order of their numbers, fitting the fractures, then "up-end" each, beginning with No. 1 and following in the order in which they lie, and the result will be the series of fractures, each differing from the other.

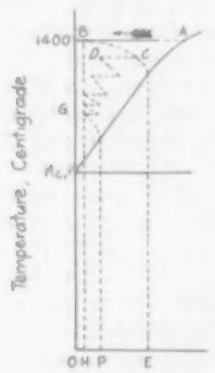


Fig. 3

No. 1 will be coarse, with a yellowish cast, and very lustrous;

No. 2 will be coarse and not quite as yellow as No. 1;

No. 3 will be finer than Nos. 1 or 2, and coarser than No. 8, and will have a fiery luster;

No. 4 will resemble No. 3 in color and luster, with somewhat finer grain, and will be coarser than No. 8;

No. 5 will be about the same size grain as No. 8, but will have fiery luster;

No. 6 will be much finer than No. 8, will have no fiery luster, will be hard through and very strong. This is what is called *refined* by hardening.

No. 7 will be refined and hard on the corners and edges, and rather coarser and not quite so hard in the middle. This is about the right heat for hardening taps, milling tools, etc., the teeth of which will be amply hard while there will be no danger of cracking the tool.

No. 8 illustrates the original grain of the bar.

GRAIN SIZE—MECHANICAL REFINING

For the economical production of various shapes and sections by rolling or forging, it is essential to heat the metal to a relatively high temperature so it may be as soft and ductile as possible. If the metal were simply cooled from such a temperature it would be coarse-grained, and the cohesion between the grains would be weakened. This would mean increased brittleness and decreased resistance to shock, which would render the material unsuitable for many purposes.

However, when mechanical working occurs, the grains are reduced to a size dependent chiefly upon the temperature at which this work ceases and, in a somewhat less degree, upon the size or mass of the piece, it being of course supposed that the work affected the entire section. The explanation for this is readily appreciated by referring to Fig. 3 (also due to Howe). The grains or crystals of iron in their normal condition being crystallographically to the isometric or cubic system, that is, their three axes are at right angles to each other and of equal length. When the length of a piece is increased by rolling or forging, there must be a proportional decrease in the cross-sectional area. The small grains or crystals which make up the structure must be

deformed to at least the same degree. This produces a condition of unstable crystallographic equilibrium, since the axes are of unequal length. To regain the normal state each grain tends to split up into several grains of smaller size, depending upon the shortest axis which limits that of the other two. At the relatively high temperatures ordinarily employed for mechanical working, the molecules have sufficient freedom of movement to bring this about.

The curve Ac_1A is the grain-size curve of Fig. 2, just discussed. If a piece of steel at a temperature, and with corresponding normal grain size, as at A, is sufficiently deformed by a single operation of mechanical working, the grain size will be reduced from A to B, equal to O H. If the piece could then be cooled instantaneously, this size should be preserved. Under ordinary circumstances, however, the cooling requires some time. In this case the grain size, being below the normal for the existing temperature, increases progressively toward that normal size. Unless interrupted, the cooling of the piece and the increase in grain size from B is along the curve B C E. After crossing the curve Ac_1A no change in the grain size takes place, as already explained in connection with Fig. 2. The final size is consequently O E.

If, however, when C is reached, mechanical working is again applied, the grain is reduced to D. By further repetitions of cooling and working the zigzag curve A B C D G is followed until G is reached. If this is the finishing temperature, the growth of the grain proceeds until, with the temperature steadily falling, the curve Ac_1A is crossed, but this time at a much lower point than before, the final grain size being O P.

It will thus be seen that for pieces of the same size, that is, with the same rate of cooling, the grain size will depend upon the finishing temperature.

Theoretically, it would be desirable to finish just above Ac_1, but, owing to the rapidly diminishing ductility, this is usually not practicable because of the danger of breaking or overtaxing the rolls or hammer, or of producing excessive strains in the material itself. This last is especially true if the piece is of very irregular section, since the molecules have lost much of their freedom of movement.

As a general proposition, the finest grain must be secured by reheating, because the piece can then be held a sufficient length of time at the proper temperature to enable the necessary rearrangement of the molecules to occur, which is not possible with mechanical working because the temperature is constantly falling.

TREATMENT AFFECTING BOTH GRAIN SIZE AND CARBON

Having taken up separately the various conditions which are met, we can now consider how heat treatment can be employed to obtain the best results. To this end we must secure as far as possible:

1. A fine grain size.
2. Fine and uniform distribution of the carbon and allied constituents.

Only in the case of eutectoid steel can this combination be met by simple treatment. What this is will be clear after considering a more complex (and usual) case. For the purpose of discussion let us select a piece of steel containing about 0.40 to 0.50 per cent. of carbon. The steel as received will have been slowly cooled after rolling or forging. Its structure consequently will be made up of relatively coarse grains consisting of pearlite surrounded by or interspersed with envelopes or bands of ferrite, the latter being formed in cooling through the critical range between Ar_3, Ar_2 and Ar_1 (O S and P S in Fig. 1). In order to obliterate this segregated ferrite it is necessary to obtain a homogeneous solid solution by reheating past Ac_3; subsequent cooling, if sufficiently rapid, will retain this solid solution when the piece is cold.

The temperature having considerably exceeded Ac_1, the grain size is not at a minimum (Fig. 2). By reheating again past this lower critical point, however, the grain will be reduced. During this last reheating the excess ferrite has separated out, but at the temperature necessary, and provided the operation has been rapid, it has not had sufficient opportunity to segregate in any marked degree. The piece should then be rapidly cooled to prevent further segregation, and if harder than desired can subsequently be reheated to the proper temperature below Ac_3.

These operations may be summarized as follows:

1. Heat (at any rate) just above Ac_3 and cool rapidly.
2. Heat rapidly just above Ac_3 and cool rapidly.
3. Heat rapidly to whatever temperature (below Ac_3) is necessary, and cool rapidly or slowly, depending on the temperature.

In practice the combination of operations 1 and 2 are often referred to as "double quenching," and of 1, 2 and 3 as "triple quenching." Such refinements of treatment are, however, usually unnecessary for ordinary purposes, even when possible.

OPERATIONS IN HEAT TREATMENT

In the above discussion it has been assumed that the piece has been small, that is, without appreciable mass. The effect of mass will be taken up presently.

These are the fundamental principles of heat treatment, which are as true for commercial work as for laboratory experiments. In the former case, however, the effect of mass is an additional factor in the problem, presenting certain new features which must be carefully considered, as they are responsible for much trouble and misunderstanding. Following are the operations commonly employed in heat treatment:

Annealing. Reheating to a certain temperature, followed by slow cooling. To obtain the maximum benefits, including refinement of the grain, it is necessary to heat slightly above the upper critical point, Ac_3; this is sometimes referred to as "true annealing."

Hardening. Heating to a temperature above Ac_3, usually above Ac_3, followed by rapid cooling. This is usually secured by quenching in some liquid such as water or oil; if the section is sufficiently small, this effect may be obtained by air cooling.

Tempering or "drawing back." Reheating after hardening; similar to annealing, but usually to a lower temperature, in order to remove excessive brittleness, and affect the hardness as little as possible.

EFFECT OF MASS ON HEAT TREATMENT

In practically all experiments which have furnished the information we at present possess, relatively very small pieces were employed. It is possible to heat or cool such pieces nearly uniformly throughout, about as rapidly as desired. When, however, the attempt is made to put into practice the principles so obtained, it is found that a new factor enters largely into the problem, namely, the mass of the object treated. For example, if a piece of fine wire is heated and then exposed to air at the ordinary temperature, it will be cooled almost in-

stantaneously, while the time required in the case of a large shaft, even when plunged into cold water, will be many minutes.

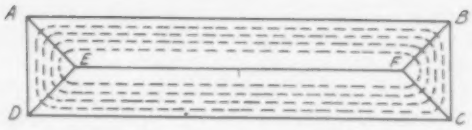


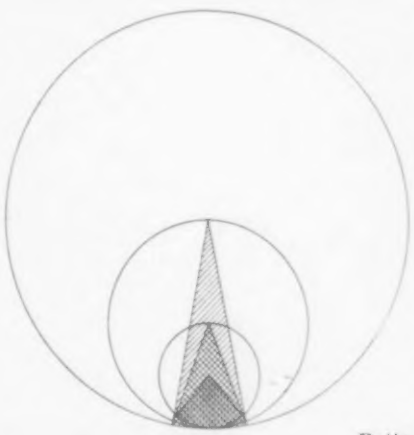
Fig. 4—Manner of Transmission of Heat

Rate of Heating and Cooling

Under similar conditions the rate of heating and cooling is much less for a large than for a small section, for two reasons:

First, because the distance to be traversed between the surface and the center, in the absorption or dissipation of heat, is greater. This rate progressively decreases as the temperature of the body, or of one portion of the body in relation to another portion, approaches that of the source of heat or refrigeration, in accordance with one of the fundamental laws of thermodynamics. Fig. 4 is intended to illustrate how the transference of heat occurs between different portions of the surface and the interior. A B C D is a section through an object uniformly heated or cooled on all sides. The transference of heat to A B F E is through A B; to A E D through A D, etc. The progressive effect is indicated by the dotted lines which are rounded at the corners of the section, because in those regions it is obtained from two sides.

Second, because the cross-section increases directly as the square of the diameter, while the circumference increases only in simple proportion to the diameter. The same relation also exists between surface and volume (mass), since these are obtained by multiplying the circumference (or perimeter) and the area, respectively, by the same value representing the length. In Fig. 5 is a table of ratios between circumference and area for circles of diameters of 1 to 10. In the same figure are shown three circles with diameters of 1, 2 and 4. The hatched portions show graphically that the same linear distance on the circumference of each must serve for the transfer of amounts of heat which are respectively 1, 2 and 4; as already explained these ratios are the same if the surfaces and volumes (masses) are substituted. This may be summarized in the general law that *for bodies of similar section the amount of heat transferred per unit of surface is directly proportional to the ratios of their diameters (or similar dimensions of their cross-section)*.



Diameter of circle	Relative Circum.	Relative Areas	Ratio Area to Circum.
1	1	1	1
2	2	4	2
3	3	9	3
4	4	16	4
5	5	25	5
6	6	36	6
7	7	49	7
8	8	64	8
9	9	81	9
10	10	100	10

Fig. 5—Relative Amounts of Heat Transmitted per Unit of Area of Surface

The preservation in the cold state of the condition which existed at the temperature to which an object is heated (above the critical point) is dependent upon a certain rate of cooling, irrespective of the size or mass of that object. With the means at our command it will readily be appreciated that a point is very quickly reached when no method of cooling can compensate for the increase in mass, so that the rate of cooling decreases with corresponding increase in the actual time required.

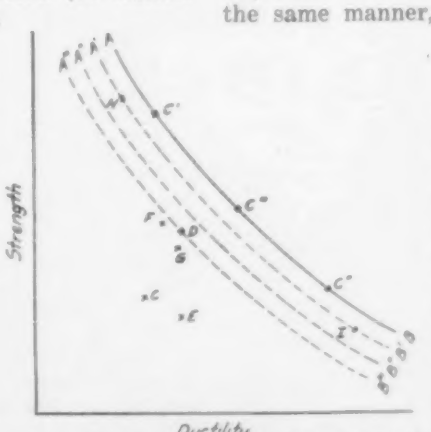


Fig. 6—Diagram Used for Discussing Effect of Mass

Annealing Rather Than Quenching Effects

As a direct result the interior of large masses will be cooled so slowly as to have only the properties of smaller masses cooled in the same time, or, in other words, the effect has been that of annealing rather than of quenching, as these terms are commonly understood. The exterior portion, although considerably retarded in its cooling by the necessary transfer through it of heat from the interior will be benefited in proportion to the rate at which its temperature was brought below the critical range, the properties of different portions of such a piece being in inverse proportion to the distance from the surface.

Fig. 6 is intended to show this state of affairs graphically, but without any claim as to its quantitative or even its qualitative accuracy. The curve A B is supposed to represent the maximum theoretical relation between strength and ductility for steel of any given composition; steels of other composition would be represented by curves varying progressively from one another. If it be tentatively admitted that this curve is correct, then a piece with the properties corresponding to the point A, with relatively high strength and low ductility, would be of equal merit with another piece with properties B, where relatively low strength is combined with high ductility; or with a piece with properties represented by any other point on the curve, since the curve is drawn on the assumption of a constant value for the relation between strength and ductility.

If a piece had only the properties C, the strength, according to our assumption, could be increased to C′, the ductility remaining the same; or the ductility could be increased to C″, the strength remaining the same; or any other maximum relation could be attained, as C‴, on the curve A B.

In actual practice or experiment, however, the factor of mass is bound to enter in, even with the smallest obtainable section, so that this maximum curve can only be approached but never quite reached. With very small pieces the experimental maximum might be as represented by the curve A′, B′; other curves A″, B″, A‴, B‴, etc., would, in the same manner, represent the possible maxima which could be attained by pieces of increasing section.

If the point C, for example, represents the properties of a large untreated section, these could probably be improved by annealing to some point E, or by quenching and tempering to F or G. With cooling more rapid than usual, as by quenching in iced brine or liquid air, followed by tempering, the point D might be reached.

Carbon Condition and the Section

The reason for the higher

relation of properties in a small section over that in a large section, treated under the same conditions, would appear to be due principally to the condition of the carbon. This is also borne out by the difference in the properties of test specimens cut respectively from near the surface and at the center of large sections, which has resulted in the clause in forging specifications that "the axis of the specimen shall be located at any point one-half the distance from the center to the surface and shall be parallel to the axis of the object tested," with a view to determining the average values.

Under suitable conditions of heating it is possible to secure a reasonably uniform temperature throughout a fairly large section. If the rate of cooling could then be controlled so that a large section could be cooled as rapidly (that is, in the same time) as a smaller object, the uniformity of the material in the two cases should be the same. As a matter of fact, however, such a state of affairs cannot be attained, as the conduction of heat from the center to the outside of a section of any size is relatively slow for the reasons already given, and cannot be hastened sufficiently by any means at our command. Even if such were not the case, there is another insurmountable obstacle in the path. This is the possible introduction of excessive strains in large pieces, particularly where there is any irregularity of section. Rupture or incipient cracks resulting from this would not be corrected by any heat treatment alone.

We are therefore confronted with the contradictory state of affairs that the larger the section the more vigorous should be the cooling; and the more vigorous the cooling the greater the liability to exvessive strains or rupture. While the component particles of the material may be advantageously affected, the object as a whole suffers. From this it is evident that for any given size or section there is a maximum relation between the ductility and strength, which decreases as the dimensions increase; that if the strength is maintained constant the ductility must decrease, and *vice versa*, as discussed in connection with Fig. 6.

Cardinal Points as to Rate of Cooling

It must consequently be realized that the possibilities as regards the physical properties of large sections are not so great as in the case of small sections, and this must be taken into consideration in drawing up the physical requirements of specifications. For, restating the case briefly, under similar circumstances:

1. The condition of the carbon and the grain size depend upon the temperature and the rate of cooling.

2. The rate of cooling depends upon the diameter or thickness of a given section, and probably also to a certain extent upon the length, or, in other words, upon the mass.

3. The rate of cooling through the critical range, and just below the lower critical point, is of much greater importance than during any subsequent tempering (after quenching).

To determine the uniformity of heating, the temperature must be of unquestioned accuracy. Further, the rate of heating must be carefully determined by experiment to secure proper penetration. It will be seen that the principles involved are comparatively simple. The main difficulty in carrying out the operations commercially is found in securing the necessary degree of uniformity. It is for this reason that special equipment is so essential. Of equal importance is the proper material, the composition of which must be definitely known, as variations, particularly in carbon, will result in different physical properties being secured under the same conditions of treatment.

Convention of Southern Supply Dealers

The fourteenth annual convention of the Southern Supply and Machinery Dealers' Association was held April 9 to 11, at Houston, Texas, the organization meeting independently this year instead of in conjunction with the American Supply and Machinery Manufacturers' Association and the National Supply and Machinery Dealers' Association as in previous years. The programme provided for business meetings on each of the three days, but it was found possible to combine the business scheduled for Friday and Saturday morning and this was done, leaving the members free to enjoy the entertainment provided for Saturday. At the closing session the following officers were elected for the ensuing year:

President, John A. Harvin, Peden Iron & Steel Company, Houston; first vice-president, J. G. Belding, Lombard Iron Works & Supply Company, Augusta, Ga.; second vice-president, Ernest Howell, Capital City Supply Company, Charleston, W. Va.; secretary and treasurer, Alvin M. Smith, Smith-Courtney Company, Richmond, Va. Committees were named as follows: Executive—I. F. Young, Young & Vann Supply Company, Birmingham, Ala., chairman; S. M. Price, S. M. Price Machinery Company, Norfolk, Va., and James Schenck, New York. Manufacturers and Conference—W. H. Banks, Banks Supply Company, Huntington, W. Va., chairman; W. J. Schafer, Russell Hardware Company, McAlester, Okla., and J. C. Fischessor, Alabama Machinery & Supply Company, Montgomery, Ala.

The sessions were well attended, a goodly representation of Northern manufacturers being present. At the opening session, over which I. F. Young, the retiring president, presided, the railroad freight rate advance question was discussed, and a resolution was passed voting confidence in the Interstate Commerce Commission, but urging that body to render a decision as quickly as possible, inasmuch as the present uncertainty is harmful to machinery interests. At an open meeting held Thursday afternoon, at which manufacturers were invited to be present, addresses pertinent to the problems of the jobber were heard and discussed. In the course of the session Friday afternoon, W. H. Banks, Banks Supply Company, Huntington, W. Va., advanced the following suggestion to r anufacturers:

One of the best things that can be done is to consider your agent as one of your family. Send him the same letters and the same kind of instructions that you send out to the regular salesman. One of the great mistakes of the manufacturer is to keep his salesmen instructed on changes in products and neglect to notify his territory agents, leaving them to shift for themselves on any sudden transitions that may occur in business.

At the same session, J. J. Kennedy, National Tube Company, Pittsburgh, said:

The realization that the interests of the manufacturer and the jobber are mutual is the starting point for thorough cooperation. The jobber should swear by the manufacturer whose goods he is handling. He should study the line he is handling and exploit it to the utmost. There should be no cutting of prices. I want to emphasize that the jobbers are not making money enough on the goods they handle.

I believe the distributing business in heavy lines is being done too cheaply. It is almost a crime that many articles are sold under profit bringing prices. During the year 1913 the jobbing interests of this country did their business without profit. It was through their desire to get a volume of business that did not exist.

A banquet at which D. K. Swartwout, Ohio Blower Company, president American Supply and Machinery Manufacturers' Association, presided was held Friday evening and toasts were responded to by J. J. Kennedy, Pittsburgh; W. M. Pattison, W. M. Pattison Supply Company, Cleveland; W. H. Banks, Montgomery, W. Va., and others. The entertainment feature of Saturday, the closing day of the gathering, was a trolley ride to Galveston, luncheon being had at the Hotel Galvez.

RUMELY COMPANY'S REPORT

The Sequel of an Ambitious Attempt to Expand a Good Business

The affairs of the M. Rumely Company, La Porte, Ind., have been so prominently before the public for the past year or more that the annual report for the year ended December 31, 1913, which has just been issued by President C. S. Funk, is of peculiar interest. The present management of the company, in charge since May 10, 1913, has had a serious task in its endeavor to correct the mistakes of those who were previously in charge of the property. President Funk has made a frank statement regarding the situation. The net result of the reorganization of the company, of the discontinuance of unprofitable practices, of charging off worthless accounts, and of house cleaning generally, was a deficit for the year of $5,407,423. This was due in a large part, he says, to a revaluation of many items on the balance sheet, the establishment of a collection reserve, the elimination of deferred charges of every character except prepaid interest and discount, and the loss on operations for the year. President Funk states that the year's losses should not be regarded as an indication of the earning power of the business. He continues:

HOW THE LOSSES OCCURRED

"The loss is explained in large part, by the increased manufacturing cost, owing to running the factory night and day the first few months of the year, with a consequent shutdown the last few months. The forced production in the early months involved excessive piece rates, unskilled help, and wastes at every point, and it is estimated the loss from manufacturing alone approximated $1,100,000.

"In the sales department a fundamental mistake was made in complete misjudgment of the market for Rumely products and the rate of gross which could be safely attained. The reduced volume of business should have shown a reduction of sales expenses of $600,000 to maintain the same ratio which held in 1912, but there was an actual increase of $600,000, thus making a relative increase of $1,200,000.

"There was, of course, a loss of gross profit through reduced volume which occurred almost entirely in the last three months of the year and is generally attributed to tight money in Canada, which has been a good field for the larger machines, and to unfavorable conditions in the United States and abroad. This amounted to $200,000. The main trouble was not in small volume but in an overestimate of increased sales. Interest charges were increased by over $800,000, due to an excessive inventory and the high interest necessitated by the company's condition."

The business of the company for 1913 amounted to $13,838,000, as against a volume of $15,144,000 in 1912 adjusted to the same basis.

The company became seriously embarrassed in the spring of 1913 by the accumulation of a large inventory of raw materials, goods in process, and finished machinery to the amount of $16,500,000, which had been provided in anticipation of a great increase in the company's business, that failed to materialize, and also by the heavily increased selling expense incurred "in an ill-advised effort to dispose of this product."

THE COMPANY'S PROSPECTS

President Funk says 63 per cent. of the company's product is in the old and well-established Advance, Rumely, Gaar-Scott thresher and steam engine lines, about which there has never been any question, and this part of the company's business will go on as heretofore and should make a satisfactory showing. About 21 per cent. of the business is in oil and gas tractors, which, he says, have now passed the experimental stage. The tractors on hand at plants, some of which suffered from over hasty manufacture during the winter of 1912-13, have been thoroughly overhauled, he says, and put in first-class condition.

The current liabilities at the close of 1913 amounted to $4,150,000, of which $1,900,000 has been exchanged for four-year unsecured notes of the company due March 1, 1918. This leaves the company, President Funk says, "in a favorable position as to liabilities."

The extension of $8,670,000 of the $10,000,000 two-year 6 per cent. notes to March 1, 1918, is set forth and the last clause in the extension agreement provides: "So long as any of these extended notes shall remain outstanding the company will not declare or pay any dividends upon either its preferred or common stock."

BALANCE SHEET OF RUMELY COMPANY

The balance sheet of the Rumely Company as presented in its annual report is a consolidated one incorporating the assets and liabilities of the M. Rumely Company, the Rumely Products Company, and the Canadian Rumely Company, Ltd. It is herewith presented in comparison with totals of the previous year. Comparisons in some particulars cannot be satisfactorily made owing to a difference in the presentation of the figures in the report under review and the figures available as presented in the balance sheet for 1912.

Assets

		Dec. 3, 1913	Dec. 31, 1912
Property account:			
Total tangible		$7,862,288	$5,282,014
Intangible—patents, etc.		1,681,949	1,656,036
Total properties		$9,544,237	$6,938,950
Investments		134,635	846,840
Current assets:			
Inventories		$11,897,564	$11,324,224
Installment notes receivable, including interest accrued thereon	$17,688,186		6,853,304
Less notes discounted	9,403,055		
Totals	$8,285,131		$6,853,304
Deduct — Commission certificates outstanding, including interest accrued thereon	1,252,396		
	$7,032,735		
Accounts receivable		1,478,907	2,065,128
Miscellaneous property held for sale		107,596	
Cash in banks and on hand		277,584	1,213,626
Totals		$20,794,387	
Deferred charges and discount on securities			988,407
Deferred charges to future operations		660,348	282,397
Deficit, as detailed per contra		5,407,423	
Total assets		$36,541,032	$32,168,012

Liabilities

Capital stock:			
Preferred		$9,750,000	$10,000,000
Common		10,908,300	10,908,300
		$20,658,300	$20,908,300
Stock of Rumely Products Company outstanding		25,000	25,000
Total capital obligations		$20,683,300	$20,933,300
Two year 6 per cent. notes due March 1, 1915		10,000,000	
Purchase money obligations		204,216	
Current liabilities:			
On company's notes payable		3,142,082	7,785,000
On accounts payable		1,011,434	1,677,852
		$4,153,516	$9,462,852
Reserve for contingent losses on notes receivable and against future collection expenses		1,500,000	1,181,029
Surplus or deficit:			
Surplus at Jan. 1, 1913		$590,830	
Deduct—Dividends paid		341,124	
Credit balance		$249,706	
Deduct—Amount of discount and deferred charges ($988,407) carried forward at Dec. 31, 1912, proportion ($735,731) of reserves against collection expenses on notes receivable and sundry adjustments ($368,060) charged off in readjustment of accounts		2,092,199	
Debit balance		$1,842,493	
Add—Loss for year		3,564,929	
Deficit, as per contra		$5,407,423	*$590,821
Total liabilities		$36,541,032	$32,168,012

*Surplus.

The C & C Electric & Mfg. Company, Garwood, N. J., announces that its Cleveland agent, Charles S. Powell, has removed to room 711 Illuminating Building, Cleveland, Ohio.

ESTABLISHED 1855

THE IRON AGE

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EDITORS

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The Colorado Labor Situation

The Committee on Mines and Mining of the House of Representatives had before it last week John D. Rockefeller, Jr., one of the directors of the Colorado Fuel & Iron Company. The chairman of the committee subjected Mr. Rockefeller to a severe ordeal, questioning him for several hours in regard to the attitude of his company in fighting the strike of coal miners which began in southern Colorado last fall and has continued since. From the reports of the hearing at Washington given in the daily press an effort was made to show that the officers of the Colorado Fuel & Iron Company have acted arbitrarily and heartlessly in their efforts to defeat the strikers. Mr. Rockefeller, however, endured the insinuations against his company with good temper and made a most excellent defense of the actions of the officers of the company. He stated that the Colorado Fuel & Iron Company is not fighting labor unions as such nor objecting to collective bargaining with them, but that what the company is resisting is the attempt to compel it to recognize union domination and therefore to put itself in a position to refuse employment to workmen who do not belong to unions. His company, he said, is contending for the real rights of workmen; that is, against coercion to deprive men of their natural right to freedom of action.

According to the Pueblo Chieftain of March 29, the Colorado mine operators, previous to the strike, had been giving their men an 8-hour workday, paying them twice a month, permitting them to board and trade where they pleased, requiring no man to take his pay in scrip, and last year gave them a 10 per cent. increase in wages. The Colorado miners, it is claimed, are now being paid the highest wages of any coal miners in the United States, with possibly one or two exceptions. Colorado has a coal-mining law which was drafted by a committee of operators and officials of the miners' union and which was not changed in any respect after it had been unanimously recommended by that committee. It is claimed to be the best law of its kind in America, and both employers and employees desire its strict enforcement. The contest for union recognition now on is one which the employers say will never be granted. The refusal of the miners to waive this demand is the only thing that has kept the strike alive to the present time.

Mr. Rockefeller stated that for the sake of labor itself and upon "the national issue whether workers shall be allowed to work under such conditions as they may choose" those interested in the Colorado Fuel & Iron Company stand ready to lose every cent of their investment in the property rather than surrender. Thus the company has taken a position which brings up what may yet prove to be a national issue. The country may be called upon to decide whether all labor in the United States is to be unionized or whether the right to work shall be open to all workmen whether they belong to unions or not. The influence of the National Government has latterly been thrown heavily in favor of the unions. The opponents of union domination are therefore at a disadvantage. The question, however, is one which cannot be permanently settled in that way. The country must declare itself as free of union domination as it is of other kinds of restraint.

Our Losses from Canada's Steel Tariff

We have already referred to the 50 per cent. falling off in iron and steel exports from the United States, in the first two months of this year. While Canada's statistics of iron and steel imports in the two periods are not yet published, it is fair to assume that the business depression there, in the past year, is responsible for the poor showing in shipments from this side in recent months. Canada, as is well known, is the best customer of our steel industry.

It has been pointed out repeatedly that the preference granted Great Britain in the Canadian tariff amounts to little in comparison with the inducements to Canadians to do business with manufacturers in the United States. Canada's enormous steel trade with the United States might well quiet the fears of those who saw orders for European steel going out from this country as soon as a margin of, say, $1 a ton showed in the foreign manufacturer's favor under our new tariff. Canadian buyers of our steel have found out that it is worth more than one or two dollars a ton to be so close to their source of steel supply that shipments could be traced, that required deliveries could be met, that claims could be promptly adjusted, that the telegraph and telephone could give hourly contact with the producer, with mail connection a matter of over night. They have not underestimated, moreover, the advantage of the credit relations established with large manufacturers on this side of the line. It is these things that have kept Canada from placing more than about 10 per cent. of her steel orders in Great Britain.

But what the preferential tariff could not do for British steel makers who coveted the Canadian market and have complained of the lack of loyalty that denied it to them, Canada is now to do for herself as fast as her steel manufacturers can get ready to benefit by the increased duties on iron and steel products. Only actual trade developments will permit of measuring the loss of trade the duties just announced will inflict on American steel manufacturers. Our wire rod exports to Canada, which have been about 60,000 tons in each of the past two years, will be practically all cut off by the new duty of $3.50 a ton, as Canada's wire rod capacity is now ample to take care of the home demand. Wrought pipe shipments from this side will be cut down, particularly in the smaller sizes. It will probably be some time before any impression will be made upon the structural steel trade our mills have had there; but the Canadian duties on these products will be raised as capacity develops there to supply them. Such development is to be expected, as diversification of Canadian steel products will be forced by the decline in rail demand, for the great railroad building programme across the border is nearing the end. In a number of lines little loss will come to our Canadian trade for some years, though it is quite certain that the total of $120,900,000 worth of American iron and steel and machinery products shipped to Canada in the fiscal year ended March 31, 1913, will long stand as a high record. Steel making has not yet been profitable to the larger Canadian companies; it will take years for the industry to become seasoned against such competition as may develop from this side, particularly in times of depression here. In the case of the largest Nova Scotia plant there is the steady handicap of distance from Canada's best consuming district, to which American works have easy access.

So far as concerns the United States Steel Corporation, which does a large part of our steel business with Canada, its disabilities under the increased tariffs will be removed when it builds its own works on the other side of the border. Yet there is some food for thought in the transplanting of industries and payrolls from the United States, now a low-tariff country, open to competition from every quarter, to a country which sees wisdom in so framing its duties that the manufacturers within its borders are assured of their home market.

Congenial Work for Secretary Redfield

It was to be expected that some Congressman would take cognizance of the announced consideration by several steel companies of the quite apparent necessity for reducing the wages of their workmen. On Monday Representative Lobeck, Democrat, of Nebraska, introduced a resolution calling for "an investigation by the Secretary of Commerce of the recent meeting of the presidents of five independent steel companies at Pittsburgh, it being alleged that at the meeting a uniform reduction in wages was arranged." A Washington dispatch states that Mr. Lobeck "wants to know the reasons for such reductions in view of the passage of the new tariff which was designed to reduce taxation and promote business prosperity." His resolution names the right official to conduct the investigation, as Secretary Redfield must be impatiently waiting for an excuse to begin the work of finding out who is responsible for this depression in business. He is the gentleman who, when the revision of the tariff began, threatened employers that if they closed their factories or reduced wages he would bring the whole machinery of his department in action to punish them.

Freight Car Needs of the Railroads

In view of the common statement that the railroads are not buying and the expectation that in the event of more favorable treatment at the hands of the Interstate Commerce Commission than they have lately received they will begin to buy more freely, it may be of interest to look into the question of car requirements from two or three angles.

In the past ten years the average number of freight cars built in the United States has been 150,000 a year, according to statistics gathered from year to year by the Railway Age Gazette. The best year was 1907, with 284,000 cars built. The poorest year in the ten was 1904, with 61,000 cars, and not much better were 1908 with 76,000 cars and 1911 with 72,000 cars.

The divergence in these figures is impressive. Car shops, apparently, are expected to be held in readiness to meet either the whims of railroad managers or the fluctuations in the supply of loanable funds. It is utterly unreasonable that in one year there should be only one-fourth as much employment for car shops as in another. Of course, the needs of traffic vary, as there may be a car shortage at the crop-moving time in one year and a surplus at the same period in another year; but clearly it would be more economical for the railroads to absorb the fluctuations, buying cars steadily with a view to the future rather than under pressure of the moment, than for the burden to be created of large investments in car shops lying idle at times, with tens of thousands of men thrown out of employment.

Inasmuch as cars cannot always be brought precisely when needed but will always be needed eventually, and since designs do not greatly change, it would be highly desirable for railroads to buy cars when they are cheapest. They would save in first cost more than they would lose in carrying a temporarily unproductive investment. The steel trade naturally would be benefited by such a balancing influence.

Orders reported thus far this year make a total of 35,000 cars, which is at the rate of fully 125,000 cars a year, equal to five-sixths of the average rate of building during the past ten years. The showing is far from being as unfavorable as might be expected from the general impression that the railroads have not been buying anything. From the experience of the past the buying is not altogether poor.

The difficult question is as to the possible requirements of the railroads in the future. Large numbers of relatively new cars are in existence, all-steel or steel underframed, and these cars promise to last a long time. There are also many decidedly antiquated cars, the question as to these being whether they have not already outlived their useful-

ness, whether it would not be better to abandon them all, replacing them with new cars as rapidly as the shops can turn them out. No quantitative estimate can therefore be made as to the prospective requirements of the railroads. As railroad men have pointed out, they need capital for this and other purposes.

Apart from the influence of old cars wearing out, there is the influence of increasing traffic, but to what extent additional cars are required to meet the needs of increasing traffic is a very broad and difficult question. Apart from a few classes of traffic in which cars are fully loaded, the average loading is less than 50 per cent. of capacity. If the loading could be increased by only a moderate amount year by year the needs of increasing traffic might perhaps be fully met by that means alone. Again, the average travel of the freight car is small, only about 23 miles a day, including empty returns, and an increase in this rate year by year would go far toward averting car shortages.

Helping to End the War on Business

A New England manufacturer who feels strongly on the subject is getting ready 5000 letters to his customers urging that the railroads be given a fair chance to work out their own salvation. He is addressing others to the Senators and Representatives from his State and is giving the men in his employ an opportunity to sign similar letters to their Congressman. In writing to this office on the subject this manufacturer says:

"Business will never be good until the railroads are allowed to advance their rates and to operate in a reasonable manner without the tremendous expense they are obliged to incur on account of unreasonable rules and regulations. Progressive railroad men realize the necessity for regulations governing the issue of securities and matters of that sort. While it is probable some railroad officers would like to operate without any regulations, they feel now that they are compelled to operate under regulations which are unreasonable."

Much missionary work of this sort is ahead of manufacturers and investors before the order to cease firing will be given by the leaders in the war on business. The bombardment is still under way at Washington. That months should pass, and all manner of minor rate questions have the right of way, while the supremely important one out of all that the Interstate Commerce Commission has before it waits, is proof of a hostility to business that seems well nigh insatiate in its infliction of punishment. Now and then some reason appears for hope of relief, only to vanish when the attempt is made to realize upon it. Then the campaign of education is taken up anew and men like our correspondent who is quoted above throw themselves into the breach. It all counts, and more heed may be given to such protests as evidences multiply in trade and industry that this war like all wars is devastating and ruinous and that a siege, like that the railroads have endured, may be as deadly as an active bombardment. The pity is that more losses of wages and profits must be the price of one more demonstration that the nation cannot prosper while an important part of it is in straits.

CORRESPONDENCE

Old Tanks Were Wrought Iron

To the Editor: We note in *The Iron Age* of March 26, page 815, data on "The Durability of Iron and Steel Tanks." Over the right hand column are the words "Condition of Steel." The use of the word "steel" alone is wrong and most misleading to those unfamiliar with the history of the subject; as all the older tanks were built of wrought iron.

GLASGOW IRON COMPANY,
Jas. P. Roe, General Superintendent.
POTTSTOWN, PA., April 4, 1914.

Chicago Foundrymen's Club

At the April meeting of the Chicago Foundrymen's Club a large proportion of the membership participated in the discussion of a paper on "Mixing Iron by Chemical Analysis," presented by W. J. Mulcahey, and another entitled "Suggestions for Cutting Foundry Costs," by A. M. Thompson.

Mr. Mulcahey outlined the essentials of the method for arriving at a particular analysis in the casting and discussed the general properties attendant upon various proportions of the more common elements. The more interesting conclusions centered about the proposition that the explanation of unexpected properties in castings, where the analysis indicated normal characteristics, is to be found in the condition of the carbon. Atmospheric conditions, conditions in the cupola and pouring conditions are all co-ordinate influences with the chemical analysis.

Mr. Thompson, speaking of a subject which is a familiar one in most foundries, presented some facts taken from his personal experience that were especially interesting for that reason. His paper made particular reference to making cores with a pitch-compound binder.

Prior to adjourning, a general statement of the plans for the foundry convention, to be held in Chicago September 7 to 12, was made by O. J. Abell. The effort that is to be made to give every variety of the foundry interests opportunity to hear and see that in which they may be concerned particularly was emphasized.

Steel Corporation Orders Decrease

The unfilled orders of the United States Steel Corporation on March 31, as reported on Friday, April 10, were 4,653,825 tons, against 5,026,400 tons on February 28, a decrease of 372,615 tons. Below is given a statement of unfilled tonnage for each month from December 31, 1910, and previous to that the amounts at the end of each year:

March 31, 1914	4,653,825	March 31, 1912	5,301,841
February 28, 1914	5,026,440	February 29, 1912	5,454,200
January 31, 1914	4,613,680	January 31, 1912	5,379,721
December 31, 1913	4,282,108	December 31, 1911	5,084,761
November 30, 1913	4,396,347	November 30, 1911	4,141,955
October 31, 1913	4,513,767	October 31, 1911	3,694,328
September 30, 1913	5,003,785	September 30, 1911	3,611,317
August 31, 1913	5,223,468	August 31, 1911	3,584,085
July 31, 1913	5,399,356	July 31, 1911	3,695,985
June 30, 1913	5,807,317	June 30, 1911	3,361,058
May 31, 1913	6,324,322	May 31, 1911	3,113,187
April 30, 1913	6,978,762	April 30, 1911	3,218,704
March 31, 1913	7,468,956	March 31, 1911	3,447,301
February 28, 1913	7,656,714	February 28, 1911	3,460,543
January 31, 1913	7,827,368	January 31, 1911	3,110,919
December 31, 1912	7,932,164	December 31, 1910	2,674,757
November 30, 1912	7,852,883	December 31, 1909	5,927,031
October 31, 1912	7,594,381	December 31, 1908	3,603,527
September 30, 1912	6,551,507	December 31, 1907	4,624,552
August 31, 1912	6,163,375	December 31, 1906	8,489,719
July 31, 1912	5,957,079	December 31, 1905	7,605,086
June 30, 1912	5,807,346	December 31, 1904	4,696,203
May 31, 1912	5,750,983	December 31, 1903	3,215,122
April 30, 1912	5,664,885	December 31, 1902	5,347,528

The National Association of Waste Material Dealers announces a meeting of the Metal Division on Tuesday, April 21, at 2 p. m., at the Hotel Astor, New York City. Invitations have been sent to a great many dealers in all sections of the United States and Canada. Various subjects will be discussed and the meeting promises to be an especially interesting one to all dealers interested in the metal business.

Hearing in Pittsburgh-Wheeling Ore Rate

WASHINGTON, D. C., April 15, 1914.—The Interstate Commerce Commission will hold its first hearing in the investigation into the freight rate on iron ore in Pittsburgh on April 24, with Chairman Harlan presiding. This case has been pending before the commission for nearly two years in one form or another. Something over a year ago the Pittsburgh Steel Company and others attacked the rate on iron ore from lower Lake Erie ports to the Pittsburgh iron and steel district as being unjust and unreasonable, and as being unduly prejudicial and discriminatory in favor of the Wheeling, Zanesville, Columbus and Jackson-Ironton districts. The rate complained of was 96c. per gross ton and it was contended that the rate should be no higher than that charged to the Wheeling and other districts, which was about 50c. or 60c. a ton.

The railroad companies, who were defendants in the proceeding, based their entire defense on what is known as the "equalizing theory" of rate making and by which they sought to so adjust the rates on the several inbound products entering into the making of pig iron at the various districts as to equalize the freight assembling costs at such districts. The commission condemned this theory of rate making, holding that it was no part of the right or duty of the railroads to attempt to regulate the economic and industrial situation in the iron and steel business.

After the opinion of the commission was handed down, the railroads reduced the Pittsburgh rate 8c., making it 88c. per ton, and raised the Wheeling rate 28c., making it 88c. a ton. Protests were filed by both the Pittsburgh and Wheeling interests, Pittsburgh contending that the railroads had not obeyed the spirit of the commission's suggestions, and Wheeling contending that the advance of nearly 50 per cent. in its rate on ore was unjustifiable. However, the commission declined to interfere with the effectiveness of the new tariffs. Thereupon the Pittsburgh Steel Company and the Wheeling Steel & Iron Company filed formal complaints.

The matter was further complicated by the fact that shortly after the 88c. rate was made effective to the Wheeling district, the Wheeling & Lake Erie Railroad split that district in half and made a 78c. rate to Steubenville and Mingo. The Pennsylvania Railroad Company followed suit, thus breaking up a grouping that had been in existence for many years.

On top of all these complications, the railroads in the fall filed with the commission tariffs increasing the Pittsburgh rate 5c. per ton, making it 93c., and also further increasing the Wheeling rates to 93c. and 83c. This was done, according to the railroads, in order to be consistent in making 5 per cent. increases in all rates at the same time. This additional advance is the subject of attack by both the Pittsburgh and Wheeling interests.

The situation having become much involved on account of the many changes in the rates being made by the carriers and the protests being so numerous, the commission instituted a general investigation into all the rates and practices of the carriers on ore from Lake Erie ports to the several furnace districts in western Pennsylvania, Ohio and northern Kentucky.

Other interests in Ohio and Pennsylvania have intervened in the investigation and will also be heard, probably at a later date. W. L. C.

The Lehigh Valley Structural Steel Company, Allentown, Pa., has filed a voluntary petition in bankruptcy with $128,736 liabilities and $110,948 assets.

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The Campaign Against Saloons Near Shops

Thomas D. West, chairman of the American Foundrymen's Association Committee on Prevention of Accidents in Foundries, solicits co-operation of manufacturers in the work of his committee. He asks any company that has suffered from the close proximity of saloons to its works to send him a photograph or crayon sketch of such saloon and its surroundings. The views should be not larger than 20 x 30 in. Mr. West says that they are to be used for exhibition purposes throughout the country, in educating workmen away from the drink habit and in persuading legislators to pass laws to prevent the location of saloons close to manufacturing plants, especially those in which the work is hazardous and where safety is made a paramount consideration. Mr. West desires to secure records of injuries and of all accidents or other evils that can be charged to saloons located near industrial property. It is desirable that all such information be in hand before May 1, but data after that time will be welcomed. Communications on this subject may be addressed to Mr. West at the Y. M. C. A. building, Prospect street, Cleveland. He will comply with any request to hold names in confidence in connection with information given him.

The Iron and Metal Market

LITTLE ENCOURAGEMENT

Some Rail and Structural Inquiry

Shipyards Are Still Busy—Sheets, Bar Iron and Pig Iron Weaker

Unfavorable sentiment pervades the steel trade to an extent that might warrant the expectation that any change is likely to be for the better. A faint improvement is indicated in a few lines, but nothing on which to base strong hopes of a buying movement.

The probability of more general wage reductions following those already made by some of the smaller companies has been widely discussed and the point is not overlooked that under present conditions such reductions might easily mean fresh concessions in selling prices. Thus far no wage changes have been reported, however, from works of the larger companies.

Most steel works and rolling mills are able to maintain the same rate of operations as at the beginning of the month, indicating that the country's consumption is better than might be judged from the smallness of new orders. Shipments are far from a starvation basis, those of the Steel Corporation averaging lately 35,000 tons a day.

Two rail inquiries have come up—20,000 tons for the Northern Pacific and 10,000 tons for the Missouri Pacific. The Southern Railway placed 9000 tons additional with the Alabama mill and the Wabash has bought 2500 tons. There is a certain amount of inquiry for railroad material that is looked upon as more for valuation purposes than as representing needs to be supplied, but sellers are now schooled against undue hopes.

The structural trade is by turns encouraged by the amount of business offering and depressed by the poor prices going with it. The New York Subway and elevated work did much to swell the March total, which led the officers of the Bridge Builders' and Structural Society to announce that 76 per cent. of the entire capacity of the bridge and structural shops of the country was contracted for in March. At Philadelphia the telephone building, 4000 tons, was let and at Los Angeles the Commercial building, 2400 tons. The Interborough Rapid Transit Company has authorized the distribution of 49,944 tons of steel for third tracking Manhattan elevated lines. The American Bridge Company took 13,423 tons, McClintic-Marshall Company, 13,619 tons, Milliken Bros., Inc., 7812 tons, Phoenix Iron Works 3929 tons, L. F. Shoemaker & Co. 4413 tons, Belmont Iron Works, 1200 tons and Pennsylvania Steel Company 5548 tons.

What has been said for several weeks concerning plate, structural shape and bar prices still holds good. Smaller buyers pay 1.20c., but the general market is 1.15c., Pittsburgh, and plates to the largest buyers have sold at 1.10c.

For 11,000 tons of plates, shapes and bars for two Government colliers to be built at Sparrows Point, the leading Pittsburgh producer is low bidder. In the widespread complaint of business the full berths of all Eastern shipyards, a condition not seen in several years, are overlooked, as is the unusual work at Lake shipyards.

The reappearance of low prices on bar iron in the Chicago district accompanies further reports of lessened specifications for steel bars—the product that has so long helped to raise the general average of activity.

Sheets are weaker, 1.90c., Pittsburgh, being commonly the basis for No. 28, while some sellers have fallen back to 1.85c. On the other hand, is the continuously excellent volume of tin plate specifications.

The chief development in the export trade is the chance of considerable rail business with Brazil and the Far East. In Canada another government loan for completing connections with transcontinental lines promises some good buying of steel. Continental steel makers are making little headway in getting their products into the United States. Recently a serious effort to place German steel water pipes in Brooklyn in a public letting failed by nearly $5 a ton. German delivered prices on bars are high, also.

Some reduction of pig iron output is under way, three merchant furnaces in the Central West having blown out, while one or two others are scheduled to stop. A good many foundries overestimated their needs in the January buying, and consumption is now running under the output of the furnaces. Pig iron prices are weaker.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

	Apr. 15, 1914.	Apr. 8, 1914.	Mar. 11, 1914.	Apr. 16, 1913.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia...	$15.00	$15.00	$15.00	$17.25
No. 2 Valley furnace....	13.25	13.25	13.25	15.50
No. 2 Southern, Cin'ti...	13.75	13.75	14.00	15.75
No. 2, Birmingham, Ala.	10.50	10.50	10.75	12.50
No. 2, furnace, Chicago*.	14.25	14.25	14.25	17.00
Basic, del'd, eastern Pa..	14.25	14.25	14.00	16.50
Basic, Valley furnace...	13.00	13.00	13.00	15.75
Bessemer, Pittsburgh....	14.90	14.90	15.15	17.90
Malleable Bess., Ch'go*.	14.25	14.25	14.25	17.25
Gray forge, Pittsburgh..	13.65	13.65	13.65	16.15
L. S. charcoal, Chicago..	15.25	15.25	15.25	18.00
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh..	21.00	21.00	21.00	28.50
O.-h. billets, Pittsburgh..	21.00	21.00	21.00	29.00
O.-h. sheet bars, P'gh...	22.00	22.00	22.00	29.50
Forging billets, base, P'gh.	25.00	25.00	25.00	36.00
O.-h. billets, Phila.....	23.40	23.40	23.40	30.00
Wire rods, Pittsburgh...	26.00	26.00	26.50	30.00
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	12.75	12.75	12.75	16.25
Iron rails, Philadelphia..	15.50	15.50	16.50	18.25
Carwheels, Chicago	11.50	11.50	11.75	16.75
Carwheels, Philadelphia..	12.00	12.00	12.75	15.00
Heavy steel scrap, P'gh..	*11.50*	12.00	12.25	14.25
Heavy steel scrap, Phila.	11.00	11.00	11.50	13.50
Heavy steel scrap, Ch'go.	9.50	9.50	9.75	12.50
No. 1 cast, Pittsburgh...	11.50	11.50	11.50	14.25
No. 1 cast, Philadelphia.	13.00	13.00	13.00	14.00
No. 1 cast, Ch'go (net ton)	10.25	10.25	10.50	12.50
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	1.22½	1.22½	1.25	1.62½
Iron bars, Pittsburgh...	1.30	1.30	1.40	1.70
Iron bars, Chicago.....	*1.12½*	1.15	1.15	1.57½
Steel bars, Pittsburgh...	1.15	1.15	1.20	1.85
Steel bars, New York....	1.31	1.31	1.36	2.01
Tank plates, Pittsburgh.	1.15	1.15	1.20	1.70
Tank plates, New York..	1.31	1.31	1.36	1.76
Beams, etc., Pittsburgh..	1.15	1.15	1.20	1.70
Beams, etc., New York.	1.31	1.31	1.36	1.71
Skelp, grooved steel, P'gh	1.20	1.20	1.20	1.45
Skelp, sheared steel, P'gh	1.25	1.25	1.25	1.50
Steel hoops, Pittsburgh..	1.25	1.25	1.30	1.60
Sheets, Nails and Wire, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	*1.90*	1.95	1.95	2.35
Galv. sheets, No. 28, P'gh	*2.90*	2.95	2.95	3.50
Wire nails, Pittsburgh..	1.60	1.60	1.60	1.80
Cut nails, Pittsburgh....	1.65	1.65	1.65	1.70
Fence wire, base, P'gh..	1.40	1.40	1.40	1.60
Barb wire, galv., P'gh...	2.00	2.00	2.00	2.20

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville, Per Net Ton at Oven:	Apr. 15, 1914.	Apr. 8, 1914.	Mar. 11, 1914.	Apr. 16, 1913.
Furnace coke, prompt...	$1.90	$1.85	$2.00	$2.25
Furnace coke, future....	2.00	2.00	2.00	2.25
Foundry coke, prompt...	2.40	2.40	2.50	3.00
Foundry coke, future....	2.50	2.50	2.75	3.00

Metals. Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.	14.75	14.87½	14.75	15.75
Electrolytic copper, N. Y.	14.37½	14.55	14.25	15.50
Spelter, St. Louis.....	5.10	5.12½	5.15	5.60
Spelter, New York.....	5.25	5.27½	5.30	5.75
Lead, St. Louis.....	3.67½	3.67½	3.90	4.20
Lead, New York.....	3.80	3.80	4.00	4.35
Tin, New York.....	36.40	36.70	38.12½	49.50
Antimony, Hallett's, N. Y.	6.75	6.75	6.90	8.50
Tin plate, 100-lb. box, P'gh	$3.30	$3.30	$3.30	$3.60

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh, in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.15c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturer's standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in....	.10
Gauges under 3-16 in. to and including No. 8....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10...	.30
Gauges under No. 10 to and including No. 12...	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles 3 ft. in diameter and over....	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft., to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.15c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs.	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909....	.70
Tees, structural sizes (except elevator, hand rail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Products.—Fence wire, Nos. 0 to 9 per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.40; galvanized, $1.80. Galvanized barb wire and fence staples to jobbers, $2; painted, $1.60. Wire nails to jobbers, $1.60. Prices of the foregoing wire products to dealers in carload lots are 5c. higher. Woven wire fencing, 73½ per cent. off list for carloads; 72½ off for 1000-rod lots; 71½ off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.60	$1.65	$1.70	$1.75	$1.85	$1.95	$2.05	$2.15
Galvanized ...	2.05	2.05	2.10	2.15	2.25	2.35	2.75	2.85

Wire Rods.—Bessemer, open-hearth and chain rods, $26.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from February 2, 1914, and iron pipe from June 2, 1913, all full weight:

Butt Weld

Steel. Inches	Black	Galv.	Iron. Inches	Black	Galv.
⅛, ¼ and ⅜	72½	52	⅛ and ¼	66	47
½	76½	66	⅜	65	46
¾ to 3	79½	71	½	69	56
			¾ to 2½	72	61

Lap Weld

2	76½	68	1¼	56	45
2½ to 6	78½	70	1½	67	56
7 to 12	75½	65	2	68	58
13 to 15	52½	..	2½ to 4	70	61
			4½ to 6	70	61
			7 to 12	68	55

Reamed and Drifted

1 to 3, butt	77½	69	1 to 1½, butt	70	59
2, lap	74½	66	2, butt	70	59
2½ to 6, lap	76½	68	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap	68	59

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	67½	57	⅜	63	52
½	72½	66	½	67	60
¾ to 1½	76½	70	¾ to 1½	71	62
2 to 3	77½	71	2 and 2½	72	63

Lap Weld, extra strong, plain ends

2	73½	65	1½	65	59
2½ to 4	75½	67	2	66	58
4½ to 6	74½	66	2½ to 4	70	61
7 to 8	67½	57	4½ to 6	69	60
9 to 12	62½	52	7 and 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends

½	62½	56	½	57	49
¾ to 1½	65½	59	¾ to 1½	60	52
2 to 2½	67½	61	2 and 2½	62	54

Lap Weld, double extra strong, plain ends

2	63½	57	2	55	49
2½ to 4	65½	59	2½ to 4	60	54
4½ to 6	64½	58	4½ to 6	59	53
7 to 8	57½	47	7 to 8	52	42

To the large jobbing trade an additional 5 and 2½ per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from January 2, 1914, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	61	1½ in.	45
2¼ in.	58	1¾ and 2 in.	49
2½ and 2¾ in.	64	2¼ in.	45
3 and 3¼ in.	69	2½ to 2¾ in.	54
3½ and 4½ in.	71	3 and 3¼ in.	57
5 and 6 in.	64	3½ to 4½ in.	60
7 to 13 in.	61	5 and 6 in.	49

Locomotive and steamship special charcoal grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.35 to 1.40
Nos. 9 to 10	1.40 to 1.45
Nos. 11 and 12	1.45 to 1.55
Nos. 13 and 14	1.50 to 1.60
Nos. 15 and 16	1.60 to 1.65

Box Annealed Sheets, Cold Rolled

Nos. 10 and 11	1.55 to 1.60
No. 12	1.55 to 1.60
Nos. 13 and 14	1.60 to 1.65
Nos. 15 and 16	1.65 to 1.70
Nos. 17 to 21	1.70 to 1.75
Nos. 22 and 24	1.75 to 1.80
Nos. 25 and 26	1.80 to 1.85
No. 27	1.85 to 1.90
No. 28	1.90 to 1.95
No. 29	1.95 to 2.00
No. 30	2.05 to 2.10

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	1.90 to 1.95
No. 12	2.00 to 2.05
Nos. 13 and 14	2.00 to 2.05
Nos. 15 and 16	2.15 to 2.20
Nos. 17 to 21	2.30 to 2.35
Nos. 22 and 24	2.45 to 2.50
Nos. 25 and 26	2.60 to 2.65
No. 27	2.75 to 2.80
No. 28	2.90 to 2.95
No. 29	3.05 to 3.10
No. 30	3.20 to 3.25

Pittsburgh

PITTSBURGH, PA., April 15, 1914.

Five or six of the leading independent steel companies are quoting plates, shapes and bars at 1.15c., f.o.b., Pittsburgh, to the steel car builders and other large consumers and 1.20c. in small lots. It is understood, however, that the market is in such deplorable shape that these products can be bought at 1.15c. on an order of practically any size. Little that is encouraging can be said about the steel trade this week. Several of the large independent steel companies have practically decided to reduce wages, and notices to this effect may be issued at any time. Prices are weak. It is not believed, however, that they will go as low as they were late last year.

Pig Iron.—There is possibly a little more inquiry for basic iron, but the general market is very dull. Some blast furnaces in the valleys have gone out, and others are said to be getting ready to do so. One Toledo and the Fannie of M. A. Hanna & Co. at West Middlesex and one Shenango are already out, and Mary furnace of the Ohio Iron & Steel Company at Lowellville will probably go out within a week. Sales of 850 tons and 1000 tons of basic are reported at $13, Valley furnace. The market on basic seems to be well sustained at this price and on Bessemer at $14. We quote: Bessemer, $14; basic, $13; No. 2 foundry, $13.25 to $13.50; gray forge, $12.75 to $13; malleable Bessemer, $13.25, for delivery through first half of this year, all at Valley furnace, the freight rate to the Pittsburgh or Cleveland district being 90c. a ton.

Billets and Sheet Bars.—Most of the sheet mills are running at a less rate, and this is being felt in specifications for sheet bars, which are not as heavy now as in February and early in March. Reports are still current of offerings of sheet bars at less than $22 and of billets at less than $21 by some of the smaller mills, but the leading makers are stated to be holding billets at $21 and sheet bars at $22 for second quarter. It is a question, however, whether these prices can be maintained. Not enough new business is coming out to test the market. We quote Bessemer and open-hearth billets at $21 and Bessemer and open-hearth sheet bars at $22, f.o.b. makers' mills, Pittsburgh or Youngstown, for April shipment; forging billets, $25 on desirable specifications, embracing only one size, and up to but not including 10 x 10 in., the regular extras being charged for larger sizes. On small orders forging billets are held at $26. We quote axle billets at $23 for desirable orders and $24 for small orders.

Muck Bar.—We quote best grades, made from all pig iron, at nominally $27.50 delivered to consumers' mills in the Pittsburgh district. Eastern muck bar is being offered here at a lower price.

Steel Rails.—Only small orders for standard sections are being placed with the local mill, but it is getting some fair-sized orders for export. The new demand for light rails is reasonably active. The Carnegie Steel Company received new orders and specifications last week for close to 2500 tons. We quote splice bars at 1.50c.; standard section Bessemer rails, 1.25c., and open-hearth standard sections, 1.34c., f.o.b. Pittsburgh. We quote light rails rolled from billets as follows: 25, 30, 35, 40 and 45 lb. sections, 1.10c.; 16 and 20 lb., 1.15c.; 12 and 14 lb., 1.20c., and 8 and 10 lb., 1.25c., in carload lots, f.o.b. Pittsburgh. For large lots, these prices might be slightly shaded.

Plates.—The Carnegie Steel Company is low bidder on about 11,000 tons of plates, shapes and steel bars for the two new colliers recently awarded the Pennsylvania Steel Company by the Government. It is expected that some time this week the order of the Steel Corporation for 2500 cars for the Bessemer & Lake Erie and 1000 for the Duluth, Missabe & Northern will be placed. The Norfolk & Western is reported as inquiring for 80 freight locomotives and the Chicago, Milwaukee & St. Paul for 29 steel passenger cars. The new demand for plates is still light and none of the plate mills has enough orders to run to over 50 to 60 per cent. of capacity. We quote ¼ in. and heavier plates at 1.15c., Pittsburgh.

Structural Material.—Local fabricators report new inquiry as a little more active. The McClintic-Marshall Company has taken 13,000 tons for third track elevated work in New York City and 500 tons for a new steel building for the Model Gas Engine Company to be built in Homewood in this city. The American Bridge Company has taken 1200 tons for transmission towers for the Tennessee Power Company, Chattanooga, Tenn. It is expected that the contract for the steel for the new telephone building in this city, about 3500 tons, will be given out in a short time, the contract for the building having been placed with the Thompson-Starrett Company. We quote beams and channels up to 15 in. at 1.15c., f.o.b. Pittsburgh.

Iron and Steel Bars.—The new demand for both iron and steel bars has fallen off materially, and mills report that specifications are not so heavy as some time ago. Several of the large steel-bar mills have decided to try to maintain the market on the basis of 1.15c., f.o.b. Pittsburgh. We quote steel bars at 1.15c. to 1.20c. and common iron bars at 1.30c. to 1.35c., f.o.b. makers' mills, Pittsburgh. Regular extras for twisting reinforcing steel bars over the base price are as follows: ¾-in. and over, $1; ½ to 11/16 in., $1.50; under ½ in., $2.50 per net ton. These extras are not always observed, and mills that roll steel bars from old rails sometimes entirely omit them.

Wire Rods.—The new demand is quiet, as most consumers are covered to July or longer, and makers of rods report that specifications against contracts are not heavy. We quote Bessemer, open-hearth and chain rods at $26, Pittsburgh. On a desirable order this price might be shaded.

Skelp.—The quiet conditions in the pipe trade are reflected in skelp, the new demand for which is light. The mills rolling skelp have not many orders on their books. Prices are not strong. We quote: Grooved steel skelp, 1.20c. to 1.25c.; sheared steel skelp, 1.25c. to 1.30c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.65c. to 1.70c., delivered to consumers' mills in the Pittsburgh district.

Ferroalloys.—Only an occasional carload of ferromanganese or ferrosilicon is being sold. Dealers are quoting 80 per cent. English ferromanganese at $39, Baltimore, but not enough new business is coming out to test the market. A local dealer reports a sale of two carloads, or about 50 tons, at $39, delivered. The freight rate to Pittsburgh is $2.16 a ton. The lower grades of ferrosilicon are slightly cheaper. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71, delivered in the Pittsburgh district. We quote 10 per cent. ferrosilicon at $19.50; 11 per cent., $20.50, and 12 per cent., $21.50, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnaces. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Sheets.—Makers report the new demand for black and galvanized sheets quiet, and specifications against contracts coming in at only a moderate rate. Some mills seem quite anxious for new business and are going after orders more aggressively, with the result that prices have eased off to some extent. Contracts for No. 28 black sheets have been taken for second quarter delivery on the basis of 1.90c. to 1.95c. and for No. 28 galvanized at 2.90c. to 2.95c., f.o.b. maker's mill. In a few cases as low as 1.85c. has been done on No. 28 black and 2.85c. on No. 28 galvanized. Operations among the mills have decreased, and on an aver-

age they are not operating to more than 60 to 70 per cent. of capacity. Blue annealed sheets are fairly firm at about 1.40c., makers' mills, for Nos. 9 and 10. We have revised prices on black and galvanized sheets and now quote No. 28 Bessemer black at 1.90c. to 1.95c.; No. 28 galvanized, 2.90c. to 2.95c.; Nos. 9 and 10 blue annealed sheets, 1.40c.; No. 28 tin mill black plate, H. R. and A., 1.90c. to 1.95c.; Nos. 29 and 30, 1.95c. to 2c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Nuts, Bolts and Rivets.—Makers report the new demand quiet, being mostly for small lots to cover actual needs. We quote button-head structural rivets at 1.60c. to 1.65c. and cone-head boiler rivets at 1.70c. to 1.75c., in carload lots, an advance of about $2 a ton over these prices being charged for small lots. Terms are 30 days net, less 2 per cent. for cash in 10 days. Discounts on nuts and bolts are as follows in lots of 200 lb. or over, delivered within a 20c. freight radius of makers' works:

Coach and lag screws	80 and 5% off
Small carriage bolts, cut threads	80% off
Small carriage bolts, rolled threads	80 and 5% off
Large carriage bolts	75 and 5% off
Small machine bolts, cut threads	80 and 5% off
Small machine bolts, rolled threads	80 and 10% off
Large machine bolts	75 and 10% off
Machine bolts, c.p.c. & t nuts, small	80% off
Machine bolts, c.p.c. & t nuts, large	75 and 5% off
Square h.p. nuts, blanked and tapped	$6.30 off list
Hexagon nuts	$7.20 off list
C.p.c. and r sq. nuts, blanked and tapped	$6.00 off list
Hexagon nuts, ⅝ and larger	$7.20 off list
Hexagon nuts, smaller than ½ in.	$7.80 off list
C.P. plain square nuts	$5.50 off list
C.P. plain hexagon nuts	$5.90 off list
Semi-fin. hex. nuts, smaller than ½ in.	85 and 5% off
Semi-fin. hex. nuts, smaller than 9/16	85, 10 & 10% off
Rivets, 7/16 x 6½, smaller & shorter	80, 10 & 5% off
Rivets, metallic tinned, bulk	80, 10 and 5% off
Rivets, tin plated, bulk	80, 10 and 5% off
Rivets, metallic tinned, packages	80, 10 and 5% off
Standard cap screws	70, 10 and 10% off
Standard set screws	75, 10 and 10% off

Tin Plate.—Makers report that specifications against contracts are still coming in at a heavy rate. This week the American Sheet & Tin Plate Company is operating to about 96 per cent. of its hot tin-mill capacity, and other large makers are running practically full, having specifications on hand for all they can turn out to July or longer. The new demand for tin plate is expected to be better in about 60 days, as there is always a new buying movement in June by consumers who contract early in the year and find they have not bought enough to cover their needs. On the few small orders now being placed, we quote 100-lb. cokes at $3.30 to $3.40 and 100-lb. ternes at $3.20 to $3.30, per base box, f.o.b. Pittsburgh.

Wire Products.—Specifications against contracts for wire and wire nails are lighter than for some time, and new buying is quiet, as jobbers and consumers covered ahead some time ago. On new orders we quote: Wire nails, $1.60; plain annealed wire, $1.40; galvanized barb wire and fence staples, $2; painted barb wire, $1.60, all per 100 lb., f.o.b. Pittsburgh, with actual freight charge to point of delivery, terms being 30 days net less 2 per cent. off for cash in 10 days. We quote cut nails at $1.65, f.o.b. Pittsburgh. Discounts on woven wire fencing are 73½ per cent. off in carload lots, 72½ per cent. off on 1000-rod lots and 71½ per cent. on less than 1000-rod lots, all f.o.b. Pittsburgh.

Hoops and Bands.—The new demand is dull, as most consumers are covered up to July and mills report specifications are coming in at only a fair rate. We quote steel bands at 1.15c., with extras as per the steel-bar card, and steel hoops at 1.25c., f.o.b. Pittsburgh.

Shafting.—Several makers report that the new demand is not more than 30 to 35 per cent. of capacity. Specifications from the implement makers are not more than 60 per cent., if that much, as heavy as they were at this time last year. The automobile builders are also not specifying for shafting as freely now as at this time last year. We quote cold-rolled shafting in carload and larger lots at 64 to 65 per cent. off, and in small lots from 61 to 63 per cent. off, delivered in base territory, depending on the order.

Spikes.—The only inquiry for railroad spikes is one from the Chesapeake & Ohio Railroad for 3000 kegs, which has come up again. Early this year the railroads bought quite heavily, but are not specifying against their contracts. The spike trade this year will not be as active as had been expected by the makers. We quote standard sizes of railroad spikes at $1.40 to $1.45 and small railroad and boat spikes at $1.50 to $1.55 per 100 lb., f.o.b. Pittsburgh.

Standard Pipe.—The new demand for oil-country goods is fairly active, but for both iron and steel merchant pipe is quiet. Some of the makers expect the demand to be materially better in a short time, owing to the return of good weather, which permits outdoor work to start up again. There are several large projects for gas and oil lines, which if they go through will require rather heavy tonnages of pipe, but rights of way have to be secured and financial plans made which may defer the placing of contracts for some time. None of the pipe mills is operating to above 75 per cent. of capacity, and some are running at a less rate. Discounts on iron and steel pipe are fairly well held.

Boiler Tubes.—The new demand for both locomotive and merchant tubes is slightly better; but prices are unsatisfactory, discounts being more or less shaded, depending on the order.

Coke.—There is no inquiry for contract furnace coke, and the new demand for spot coke is dull. Several furnaces in the valleys have gone out, and this will decrease the consumption of coke materially. Sales of about 40 cars of standard furnace coke for prompt shipment are reported at about $1.90 at oven, but if any large business came out, $1.85 or less could be done. Some of the Valley furnaces have been getting coke faster than they can handle it and are holding up shipments to some extent. Several makers are still quoting $2 per net ton at oven for best makes of furnace coke on contract. Standard 72-hr. foundry coke to consumers is held at $2.40 to $2.50 per net ton at oven. The Connellsville Courier reports the output of coke in the Upper and Lower Connellsville regions for the week ended April 4 as 356,320 net tons, a decrease over the previous week of about 4000 tons.

Old Material.—The scrap trade continues depressed and prices are weak. None of the large consumers is in the market. The Pennsylvania Railroad has declared an embargo on scrap routed to the South Side mills of the Jones & Laughlin Steel Company on account of the strike on its Monongahela division. We note sales of 200 tons of cast-iron borings at $7.50 and 500 tons of selected heavy steel melting scrap at $12.25 delivered. Dealers are now quoting, per gross ton, for delivery to consumers' mills in the Pittsburgh and nearby districts that take the same rates of freight as follows:

Selected heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon Monessen, Midland and Pittsburgh delivery	$12.00 to $12.25
Ordinary steel melting scrap	11.50 to 11.75
Compressed side and end sheet scrap	10.50 to 10.75
No. 1 foundry cast	11.50 to 11.75
No. 2 foundry cast	10.25 to 10.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.50 to 8.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	12.75 to 13.00
No. 1 railroad malleable stock billet and bloom ends	11.00 to 11.25
Railroad grate bars	10.25 to 10.50
Low phosphorus melting stock	14.50 to 14.75
Iron car axles	22.50 to 23.00
Steel car axles	15.50 to 16.00
Locomotive axles, steel	20.00 to 20.50
No. 1 busheling scrap	10.25 to 10.50
No. 2 busheling scrap	7.25 to 7.50
Machine shop turnings	7.50 to 7.75
Old carwheels	11.25 to 11.50
Cast-iron borings	7.75 to 8.00
†Sheet bar crop ends	12.00 to 12.25
Old iron rails	13.75 to 14.00
No. 1 railroad wrought scrap	11.50 to 11.75
Heavy steel axle turnings	8.50 to 8.75
Heavy breakable cast scrap	12.00 to 12.25

†Shipping point.

Merchant Steel.—Makers report the new demand quiet, being only for small lots, and state that specifications against contracts placed early in the year are not coming in as they would like. On any desirable

orders prices are being shaded. We have reduced prices $1 a ton, and now quote: Iron finished tire, ½ x 1½ in. and larger, 1.30c., base; under ½ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c., base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Chicago

CHICAGO, ILL., April 14, 1914.

Few angles remain from which new light can be thrown upon the iron and steel market. Business is sufficiently powerful to overcome any known handicap, but is the embodiment of timidity in the face of uncertainty. The railroad situation continues the barometer of conditions. All of the major branches of the industry appear disposed to await some decision in the freight rate case, and even in the minor trades the tendency to limit activity is spreading to an astonishing degree. There are many who are expecting that the handing down of a decision in the rate case, whether favorable or unfavorable to the railroad plea, will mark a sharp turn for the better. Many rumors of a liquidation in labor are current, but in the Chicago mill district reductions in wages have been neither contemplated nor proposed. As compared with last fall, the mills have little if any more work for their men to do, but the situation is materially relieved by the migration of labor to outdoor forms of employment. Prices of the principal steel products are now generally quoted at 1.33c., Chicago, and round tonnages for car building have been taken on the basis of $1 a ton lower. Some inquiry for standard rails has appeared, and sales of about 3000 tons of girder rails for street railroad work are noted. Specifications in all lines are falling off. Trading in pig iron and scrap is purely perfunctory.

Pig Iron.—Inquiries for pig iron during the week, if somewhat heavier, was not more significant, for melters find no occasion to interest themselves in the market except to meet the needs of immediate circumstances. Lake iron is being quoted on the same basis as has prevailed for the last few weeks. For third quarter and last half delivery a premium of 50c. a ton is being asked. In the South, also, the furnaces continue to maintain a determined front in quoting for future delivery. Reports as to the disposition of the principal producers indicate a purpose to blow out furnaces rather than to make a campaign for low-priced iron. The quotation of $10.50 f.o.b. Birmingham is available for prompt shipment only. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal	$15.25 to $16.25
Northern coke foundry, No. 1	14.75 to 15.00
Northern coke foundry, No. 2	14.25 to 14.75
Northern coke foundry, No. 3	14.00 to 14.25
Southern coke, No. 1 f'dry and 1 soft	15.35 to 15.85
Southern coke, No. 2 f'dry and 2 soft	14.85 to 15.35
Southern coke, No. 3	14.35 to 14.85
Southern coke, No. 4	13.85 to 14.35
Southern gray forge	13.35 to 13.85
Southern mottled	13.10 to 13.35
Malleable Bessemer	14.25 to 14.50
Standard Bessemer	17.00
Basic	13.75 to 14.25
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. sil'vy, 10 per cent.	18.90 to 19.40

Rails and Track Supplies.—At Louisville, awards of 700 tons and 400 tons of girder section rails were made to the Lorain Steel Company and the Pennsylvania Steel Company, respectively. Other purchases of traction rails brought the total placed last week to about 3000 tons. Except in a few instances, where some of the railroads appear to be reviving inquiries for rails whose purchase has long been proposed, new orders are entirely lacking. We quote standard railroad spikes at 1.50c. to 1.55c., base; track bolts with square nuts, 2c. to 2.10c., base, all in carload lots, Chicago; tie plates, $26 to $28 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Plates.—The mills are finding it necessary to accept 1.33c., Chicago, if they wish to secure even the ordinary business offered. The material recently purchased by car builders was placed at prices equivalent to 1.10c., Pittsburgh, or 1.28c., Chicago. There has been no improvement in the total tonnage available for rolling. We quote, for mill shipment of plates, for Chicago delivery, 1.33c.

We quote for Chicago delivery of plates, from jobbers' stock, 1.75c.

Sheets.—Specifications against contracts have fallen off markedly. To secure specifications at all, where contract prices are higher than the present market, mills are finding it necessary to reduce the price accordingly. Quotations higher than the basis of 1.90c., Pittsburgh, for black sheets are now entirely eliminated. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.58c.; No. 28 black, 2.08c.; No. 28 galvanized, 3.08c.

For sheets out of store we quote for Chicago delivery as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.45c. to 2.55c.; No. 28 galvanized, 3.50c. to 3.60c.

Bars.—The general depression is being accentuated by a falling off in business, even in those lines where tonnage has been moderately satisfactory, as in steel bars. The demand for reinforcing bars is perhaps an exception. Bar-iron orders are running slightly in advance of the tonnage during the corresponding period in March. This small increase may be attributed to the reappearance of lower prices, 1.12½c., being noted in several instances during the week. We quote for mill shipments as follows: Bar iron, 1.12½c. to 1.15c.; soft steel bars, 1.38c.; hard steel bars, 1.30c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off.

Hoops and Bands.—With the natural period of greatest activity in hoops and bands tapering off into the mid-year period of quietness, the new business offering is light but specifications are holding up comfortably well. Prices have been maintained with fair regularity, concessions from the Pittsburgh quotation of 1.30c. for hoops being the exception, though for bands quotations of 1.15c., Pittsburgh, are not uncommon. We quote for Western delivery for bands, 1.33c. to 1.38c., and for hoops, 1.43c. to 1.48c.

Rivets and Bolts.—The limitations which have been placed on bolt purchases by the two leading consumers, the railroads and the agricultural implement interests, leave little to be hoped for pending an improvement in the business of these users. The local mills could comfortably absorb as well a much larger tonnage in rivet orders than is available. We quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-5; cut thread, 80; larger sizes, 75-5; machine bolts up to ⅜ x 4 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-10; coach screws, 80-15; hot pressed nuts, square head, $6.20 off per cwt.; hexagon, $7 off per cwt. Structural rivets, ½ to 1¼ in., 1.73c. to 1.78c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2.35c.; boiler rivets, 2.55c.; machine bolts up to ¾ x 4 in., 75-10; larger sizes, 70-10-5; carriage bolts up to ⅜ x 6 in., 75-5; larger sizes, 70-10 off; hot pressed nuts, square head, $6.00, and hexagon, $6.70 off per cwt.

Wire Products.—Building operations, upon which the demand for wire nails so closely depends, have been affected by unsettled weather conditions to the detriment of the trade. Quotations indicate that prices

are not being so firmly held, and on the basis of the nominal quotations there is little incentive for buying beyond immediate necessities. Wire for fencing purposes is supported by a demand that seems to offer more resistance to unfavorable influences. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.58; wire nails, $1.78; painted barb wire, $1.78; galvanized, $2.18; polished staples, $1.78; galvanized, $2.13, all Chicago.

Cast-Iron Pipe.—The prospective purchase of about 15,000 tons of pipe for Highland Park, on the outskirts of Detroit, is the center of interest for manufacturers, who are competing against proposals for the installation of wood and steel pipe. At Cleveland, the United States Cast Iron Pipe & Foundry Company was the successful bidder for 7500 tons. An award of from 300 to 800 tons of small pipe is to be made at South Bend, Ind., this week. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $26; 6 to 12 in., $24; 16 in. and up, $23.50, with $1 extra for gas pipe.

Old Material.—Values for scrap were practically unchanged throughout the week. Buying by dealers to cover short orders makes up the greater portion of current activity. Interesting sales of heavy melting steel for shipment to Youngstown are noted, netting $9.40 at Chicago. Inquiry for railroad malleable is reported at an offered price of $9.50, delivered. Stove-plate scrap presents something of an anomaly in the high price at which it is held, despite an absence of demand quite as marked as for many of the other grades. The small amount of new scrap, not only of stove plate but of many other grades as well, that is being offered in the market leads to the impression that old material stocks for marketing have been greatly diminished. In addition to its almost daily offerings, the Santa Fé Railroad is this week asking prices on 1000 tons of wrought scrap. The Michigan Central Railroad has 1500 tons to sell and the Chicago, Milwaukee & St. Paul 1000 tons. We quote, for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$12.75 to $13.25
Old steel rails, rerolling	11.50 to 12.00
Old steel rails, less than 3 ft.	10.50 to 11.00
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	11.50 to 12.00
Heavy melting steel scrap	9.50 to 10.00
Frogs, switches and guards, cut apart	9.75 to 10.00
Shoveling steel	9.00 to 9.25
Steel axle turnings	6.75 to 7.25

Per Net Ton

Iron angles and splice bars	$12.25 to $12.75
Iron arch bars and transoms	12.25 to 12.75
Steel angle bars	8.75 to 9.25
Iron car axles	17.50 to 18.00
Steel car axles	12.50 to 13.00
No. 1 railroad wrought	9.00 to 9.25
No. 2 railroad wrought	8.50 to 9.00
Cut forge	8.00 to 8.50
Steel knuckles and couplers	9.00 to 9.50
Steel springs	9.50 to 10.00
Locomotive tires, smooth	10.00 to 10.25
Machine shop turnings	4.75 to 5.25
Cast borings	4.50 to 5.00
No. 1 busheling	7.50 to 8.00
No. 2 busheling	6.00 to 6.50
No. 1 boilers, cut to sheets and rings	6.50 to 7.00
Boiler punchings	9.25 to 9.75
No. 1 cast scrap	10.25 to 10.50
Stove plate and light cast scrap	9.25 to 9.75
Grate bars	9.00 to 9.50
Railroad malleable	9.25 to 9.75
Agricultural malleable	8.25 to 8.75
Pipes and flues	7.00 to 7.50

Philadelphia

PHILADELPHIA, April 14, 1914.

Quiet conditions have been accentuated by two holidays, Good Friday and Easter Monday. On the other days consumers were apathetic and the spirits of sellers were dampened accordingly. Some of them refer more apprehensively to the effects of the tariff on the Atlantic seaboard, but all look forward hopefully to the railroad freight rate decision. Pig iron is quieter. In cast-iron pipe and iron bars there have been cases of price cutting. The demand for plates has been irregular and some business has been sought at lower figures. A few contracts involving structural material, but not large quantities, have been placed. Sheets are slightly less active and a trifle weaker. In old material there has been no activity and prices are easy, although sellers are disinclined to accept offers which have been made at lower than quoted prices for heavy melting steel.

Pig Iron.—Both sales and inquiries are few and so minor in character as compared with normal activity that apathetic is a mild word to use in describing the market. Few foundries in eastern Pennsylvania are operating more than 50 per cent. of capacity and many of them are doing less, but deliveries of pig iron are holding up surprisingly well. Buyers are not inclined to talk prices and the general opinion is that prevailing quotations are not standing in the way of purchasing, but that dull demand for their own products, coupled with hesitancy traceable to the railroad freight rate question and the tariff, is responsible for inaction. Sellers therefore maintain that there is no occasion for them to quote lower even if they were disposed to do so. The busiest consumers of iron are those who make agricultural implements, but there are few of these in this territory and their busy season is nearing its end. Among the few purchases which can be mentioned is one of 500 tons of malleable iron, by a local manufacturer of fittings. The Norfolk & Western Railroad has bought over 1000 tons of No. 1 and No. 2 Virginia iron from furnaces along its line, also 300 tons of charcoal iron and something under 600 tons of Bessemer. There is an unconfirmed report that a soil pipe maker bought between 1000 and 2000 tons of iron which ran a little better than gray forge. Small lots of standard low phosphorus have been taken at $21, delivered. A Virginia company, represented here, has disposed of 1600 tons this month and its representatives say that the best phase of the situation is that their customers continue to take what they had previously purchased. Without change the following range of prices about represents the market for near delivery in buyers' yards in this district, with the minimum probably nearer the actual market:

Eastern Penna. No. 2 X foundry	$15.00 to $15.25
Eastern Penna. No. 2 plain	14.75 to 15.00
Virginia No. 2 X foundry	15.55 to 15.75
Virginia No. 2 plain	15.55 to 15.75
Gray forge	14.00
Basic	14.25
Standard low phosphorus	21.00

Iron Ore.—Business is dormant, but interest is growing with regard to the prices to be established for Lake ore. The opinion is expressed that eastern Pennsylvania should find it easier to obtain good ore. Importations in the week ended April 11 consisted of 5481 tons from Sweden and 6255 tons from Cuba.

Ferroalloys.—Quiet continues, with prices unchanged. The quotation for English 80 per cent. ferromanganese is $39, seaboard, and for German, $38. One sale of two carloads of English at the full price is reported. Ferrosilicon, 50 per cent., is quoted at $71 to $73, Pittsburgh, according to quantity, the highest figure being for carload lots.

Cast-Iron Pipe.—Despite some price cutting by makers desirous of increasing their tonnage, the average quotation for 6-in. pipe at local foundries is about $21.50 per net ton, standard weight, in carload lots at the foundry, with 4-in. $2 higher and larger sizes 50c. less. The volume of business is pronounced normal in the North and improving in the South. The largest interest has obtained a contract from the city of Pittsburgh for 7500 tons at an average price of about $21.65, the bulk of the order calling for 20, 24 and 30-in. pipe.

Billets.—The demand shows no signs of improvement, orders being small and for near delivery. Quotations are continued at $23.40 to $24.40 for open-hearth rolling billets. Forging steel commands the usual advance of $4 to $5 per ton.

Structural Material.—New business is scarce and the general situation is unaltered, except that 1.15c., Pittsburgh, or 1.30c., Philadelphia, can be more easily obtained. For carload lots, however, 1.35c., Philadelphia, is still mentioned, while for miscellaneous lots a shade higher might be obtained. The latter business, however, is not of the kind on which makers can flourish. The Germantown high school, which is to

take between 500 and 600 tons of shapes, has been awarded to Thomas Reilly, a local contractor and builder. Bids are going in this week on a coal breaker and two steel head frames for the Delaware, Lackawanna & Western Coal Company for delivery near Wilkes-Barre, Pa., all of which will approximate 1000 tons. Cramp & Sons, Philadelphia, are understood to have been verbally awarded the Board of Home Missions Building in this city, which will require between 500 and 600 tons. Bids are in on the plant of the Taylor-Wharton Iron & Steel Company at Easton, which will take about 3100 tons and it is stated that the McClintic-Marshall Company is low. The Bell Telephone Company building, which is really desirable business, involving 4000 tons, is yet to be placed, though bids are in.

Plates.—Business is somewhat irregular, good influxes of orders being alternated with quiet periods. A mill of small capacity is said to have cut ruling prices to obtain needed business, but 1.15c., Pittsburgh, or 1.30c., Philadelphia, is about the representative price for desirable business. Makers are emphatic, however, in saying that 1.35c. Philadelphia, for carloads, and 1.38c. for part carloads, have not been abandoned.

Bars.—Iron bars are dull and business has been done at 1.20c., Philadelphia, according to report. Most sellers, however, quote 1.22½ to 1.25c., delivered here. Steel bars are unchanged at 1.30c. to 1.35c., delivered. Business in concrete reinforcing bars is developing more slowly than had been expected.

Sheets.—A slight falling off in specifications has been noted and the market is a little weaker, though 1.55c., Philadelphia, remains the quotation for No. 10 blue annealed sheets.

Old Material.—Inquiry is light and transactions have been few, but dealers reiterate that any change which comes is pretty certain to be a turn upward. Buyers do not seem so sure of this and have made offers of $10.50 for No. 1 heavy melting steel, but got no acceptances. Though prices have held up they are easy. The following quotations about represent the market for deliveries in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates varying from 35c. to $1.35, per gross ton:

No. 1 heavy melting steel	$11.00 to $11.25
Old steel rails, rerolling	13.00 to 13.50
Low phosphorus heavy melting steel scrap	14.50 to 15.00
Old steel axles	15.25 to 15.75
Old iron axles	21.00 to 22.00
Old iron rails (nominal)	15.50 to 16.00
Old carwheels	12.00 to 12.50
No. 1 railroad wrought	13.25 to 13.75
Wrought-iron pipe	10.50 to 11.00
No. 1 forge fire	8.50 to 9.00
Bundled sheets	8.50 to 9.00
No. 2 light iron	5.00
No. 2 busheling	8.00 to 8.50
Wrought turnings	8.00 to 8.50
Cast borings	8.50 to 8.75
Machinery cast	13.00 to 13.50
Grate bars, railroad	8.50 to 9.00
Stove plate	9.00 to 9.50
Railroad malleable	9.00 to 9.50

Coke.—Standard Connellsville furnace coke is quiet at $1.90 to $2 per net ton at oven for prompt and about $2 on contract. Up to $2.15 is asked for special qualities. Connellsville foundry coke is quoted at $2.40 to $2.60 per net ton at oven, with some grades up to $2.75 for both prompt and contract. Freight rates to this city from the producing districts are as follows: Connellsville, $2.05; Mountain, $1.65; Latrobe, $1.85.

Cleveland

CLEVELAND, OHIO, April 14, 1914.

Iron Ore.—No signs of life appear in the ore market. In the past 10 years there were two in which the buying movement did not start until late in May, and it is not improbable that the buying will be deferred fully as long this year. It is now almost 18 months since the last buying of Lake Superior ore in any volume, the buying movement for 1913 having taken place in November of 1912. Little ore will be shipped this year in May and leading shippers have advised vessel owners that they will not be in the market for wild tonnage until June. We repeat 1913 prices as follows: Old range Bessemer, $4.40; Mesaba Bessemer, $4.15; old range non-Bessemer $3.50; Mesaba non-Bessemer, $3.40.

Pig Iron.—The market is lifeless. No sales are being made larger than an occasional carload order, and no new inquiries have come out from this territory or near vicinity. Some local sellers, however, report an improvement in inquiry for iron for shipment to Eastern points. Conditions in the foundry trade in the Central West do not offer any encouragement to a buying movement for the last half, and sellers do not expect to have much inquiry for iron for that delivery for some time. With no business to test prices Cleveland furnaces are adhering to the $14 price for No. 2 foundry. Southern iron is freely offered at $10.50, Birmingham, for early delivery. We quote, delivered Cleveland, as follows:

Bessemer	$14.90
Basic	$13.90 to 14.00
Northern No. 2 foundry	14.25
Southern No. 2 foundry	14.85 to 15.10
Gray forge	13.50
Jackson Co. silvery, 8 per cent. silicon	17.55

Coke.—The coke market is extremely dull, no sales being reported in either furnace or foundry grades. Prices are unchanged. Best makes of foundry coke are held at $2.50 to $2.75 per net ton at oven. We quote standard Connellsville furnace coke at $1.85 to $2 for early shipment.

Finished Iron and Steel.—The demand for structural material and plates shows an improvement. In the past two weeks northern Ohio tank shops have placed orders for about 10,000 tons of plates for early delivery for oil tank work, two orders being for 3000 tons each and a third for 2000. It is stated that an increase in the oil supply in some districts has made the existing pipe lines inadequate to move the oil, and because of this there is a heavy demand for new tanks. Prices are not firm, but show little change. Steel bars are quoted at 1.15c. for desirable orders and 1.20c. for small lots. Plates are generally quoted at 1.15c. Structural material is quoted at 1.20c., but this price can probably be shaded $1 a ton on a desirable order. The Van Dorn Iron Works Company has taken 250 tons for a new building for the Cleveland Worsted Mills Company; the Mt. Vernon Bridge Company, 275 tons for a shop for the Alliance Machine Company and 255 for a Pennsylvania Railroad bridge in Alliance; the Toledo Bridge & Crane Company, 200 tons for a plant for the Toledo Pipe Threading Machine Company. A Cleveland brake beam company has placed an order for 3000 tons of steel bars and shapes. The filtration plant in Cleveland, for which bids will be received April 21, will require 2000 tons of steel reinforcing bars. Sheets show some improvement in demand. We quote No. 28 black sheets at 1.90c., No. 28 galvanized at 2.90c. and No. 10 blue annealed at 1.45c. for delivery through May, but some mills are shading these prices $1 or more per ton. Bar iron is dull, with quotations at 1.20c. to 1.25c., Cleveland. The United States Cast Iron Pipe & Foundry Company has taken 8500 tons of cast-iron pipe for the city of Cleveland. We quote warehouse prices at 1.80c. for steel bars and 1.90c. for plates and structural material.

Bolts and Rivets.—New demand for bolts is light and the market shows a weakening tendency. Rivet specifications are fairly good and prices unchanged at 1.55c. for structural and 1.65c. for boiler for desirable orders. We quote discounts as follows: Common carriage bolts, ⅜ x 6 in. smaller or shorter, rolled thread, 80 and 5 per cent.; cut thread, 80 per cent.; larger or longer, 75 and 5 per cent.; machine bolts with h.p. nuts, ⅜ x 4 in. smaller or shorter, rolled thread, 80 and 10 per cent; cut thread, 80 and 5 per cent.; larger or longer, 75 and 10 per cent.; coach and lag screws, 80 and 15 per cent.; square h.p. nuts, blank or tapped, $6.30 off; hexagon h.p. nuts, blank or tapped, $7.20 off; c. p. c. and t. square nuts, blank or tapped, $6 off; hexagon, ⅝ in. and larger, $7.20 off; 9-16 in. and smaller, $7.80 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10 and 5 per cent; 9-16 in. and smaller, 85, 10, 10 and 5 per cent.

Old Material.—The tone of the scrap market has improved. While few sales are reported some inquiry has developed from large consumers and dealers are looking for some change for the better. Prices have apparently reached bottom and are firm at the present level. However, no advances are looked for in the near future. There is some disposition among producers and dealers

to hold their scrap. For heavy melting steel $10.50 is being offered by a local mill and $11.75 to $12 by Valley mills. The embargo at the Upson plant continues and some other mills are holding back on shipments. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails, rerolling	$11.50 to $12.00
Old iron rails	13.50 to 14.00
Steel car axles	15.00 to 15.25
Heavy melting steel	10.50 to 11.00
Old carwheels	11.50 to 12.00
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	8.50 to 9.00
Railroad malleable	10.75 to 11.00
Light bundled sheet scrap	7.50 to 8.00

Per Net Ton

Iron car axles	$18.00 to $19.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings	5.25 to 5.50
Steel axle turnings	6.75 to 7.25
No. 1 busheling, new	8.75 to 9.00
No. 1 busheling, old	8.00 to 8.25
No. 1 railroad wrought	10.00 to 10.50
No. 1 cast	10.75 to 11.00
Stove plate	8.75 to 9.00

Cincinnati

CINCINNATI, OHIO, April 15, 1914.—(*By Wire.*)

Pig Iron.—The stagnant condition of the market cannot be attributed to any differences of opinion on prices between buyers and sellers. Neither side is able to give definite information as to the cause of the present unparalleled quiet state of the market. The foundry melt has fallen off to some extent in this vicinity and relatively few consumers have contracted for last half requirements. Others who need iron for the second quarter are content to buy in carload quantities. As buying has been held up for practically five weeks, the majority of iron merchants are predicting a change for the better that may come at an unexpected moment. Southern iron is offered at $10.50, Birmingham basis, and while no open quotations are out for third quarter delivery as low as this, it is understood that business for that shipment would be acceptable. Northern foundry and basic are unchanged at $13.50, Ironton, although no sales are being consummated, with the exception of a few carloads for nearby consumers. A Detroit manufacturer contracted for 2000 tons of malleable for shipment over the next three or four months, but no definite information is available as to the price paid. There is no demand for basic, nor will there be for some time, as only a limited tonnage is yet to be purchased in this territory. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$14.25 to $14.75
Southern coke, No. 2 f'dry and 2 soft	13.75 to 14.25
Southern coke, No. 3 foundry	13.25 to 13.75
Southern No. 4 foundry	12.75 to 13.25
Southern gray forge	12.25 to 12.75
Ohio silvery, 8 per cent. silicon	17.20 to 17.70
Southern Ohio coke, No. 1	15.70 to 16.20
Southern Ohio coke, No. 2	14.70 to 15.20
Southern Ohio coke, No. 3	14.45 to 14.70
Southern Ohio malleable Bessemer	14.70 to 15.20
Basic, Northern	14.70 to 15.20
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(*By Mail*)

Coke.—The rumored purchase of Pocohontas 48-hr. coke by a southern Ohio furnace, reported last week, has now been definitely confirmed. As to the exact quantity, it is now stated that only 25,000 tons was contracted for, although if the full last half requirements had been covered by the furnace double this tonnage would be required. This is the only important sale of furnace coke made in this territory for some weeks, very small quantities for domestic use having been disposed of from time to time. Foundry coke is stagnant. A few carloads are being bought for urgent needs, but the new business is about offset by requests from a number of foundry men to delay shipments on their contracts. In the face of dull conditions prices are unchanged. Connellsville furnace coke is quoted around $1.90 to $2 per net ton at oven, with the latter figure asked for favorite brands. It is not denied that a few brands can be secured at $2 for shipment through the year. Foundry coke remains at $2.50 to $2.75 per net ton at oven. Both Pocahontas and Wise County quotations range about 10c. a ton higher than the figures named above.

Finished Material.—There is more activity in sheets, both black and galvanized, than in any other class of finished material. However, orders are confined mostly to nearby requirements. Prices have sagged, following Pittsburgh quotations, and this week we quote No. 28 sheets at 2.05c. to 2.10c. for black, f.o.b. Cincinnati, or Newport, Ky., and 3.05c. to 3.10c. for galvanized. Steel bars from warehouse are quoted at 1.75c. and small structural shapes at 1.85c. Railroad track material is in poor demand. Although there are many bridge and large building contracts in sight in this territory, no specifications of note have been issued lately that would interest the larger mills.

Old Material.—The market is at an almost complete standstill. The rolling mills are buying small quantities of special scrap, but the foundries have a supply on hand, and are not now placing orders. From a few sources it is reported that the railroad offerings are lighter, but this is doubtless due to the low prices prevailing. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum figures are dealers' prices f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	$7.00 to $7.50
Old iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up	20.00 to 20.50
Rerolling steel rails	11.00 to 11.50
Melting steel rails	9.50 to 10.00
Old carwheels	10.50 to 11.00

Per Net Ton

No. 1 railroad wrought	$9.00 to $9.50
Cast borings	4.75 to 5.25
Steel turnings	4.75 to 5.50
Railroad cast scrap	9.50 to 10.00
No. 1 machinery cast scrap	10.50 to 11.50
Burnt scrap	6.25 to 7.00
Old iron axles	17.00 to 17.50
Locomotive tires (smooth inside)	10.00 to 10.50
Pipes and flues	6.50 to 7.00
Malleable and steel scrap	7.50 to 8.00
Railroad tank and sheet scrap	5.50 to 6.00

Birmingham

BIRMINGHAM, ALA., April 13, 1914.

Pig Iron.—The stagnation in this market has become even more complete. As an illustration, one company reports that it has sold a total of 55 tons this month up to the 10th. It is current report that one interest, which made a special effort to sell at $10.50, succeeded in marketing only 300 tons in an entire week. Perhaps never in the history of the iron trade in this section has there been so little business transacted as the past two weeks. Some makers can hold off a little longer, but there are others who must very soon either sell at what is offered or shut down. Production, however, will be less this month than in any month in several years. There are only 18 stacks in operation as compared with 21 in March. The Gulf States Steel Corporation is operating its wire fencing department on full time and adding to the plant's capacity, but its nail mill is running only 65 per cent., and its bar mill about 15 per cent. The appearance of foreign steel bars at New Orleans, offered at $4.40 per ton under the Birmingham price, has vitally affected the bar trade. The steel mills of the leading interest are finding it difficult, it is understood, to maintain a 50 per cent. gait. We quote pig iron, per gross ton, f.o.b. furnaces as follows:

No. 1 foundry and soft	$10.00 to $11.25
No. 2 foundry and soft	10.50 to 10.75
No. 3 foundry	10.00 to 10.25
No. 4 foundry	9.75 to 10.00
Gray forge	9.50 to 9.75
Basic	10.25 to 10.75
Charcoal	23.25 to 23.75

Cast-Iron Pipe.—No new orders of any size have been received recently, but plants continue to operate on orders that are sufficient in the aggregate to prevent large stock accumulations. Sanitary pipe shops report additional orders from the Northwest, with prices fairly well maintained. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $21; 6-in. and upward $19, with $1 added for gas pipe.

Coal and Coke.—There are still some idle coal mines and the stimulus incident to summer stocking up has not greatly revivified the trade. Coke, owing to the decrease in output, finds a readier market, with prices

stationary. We quote, per net ton, f.o.b. ovens, as follows: Furnace coke, $2.60 to $2.75; foundry, $3.20 to $3.60.

Old Material.—As in pig iron, there is no market. There is small trading for immediate necessities, but no business of any magnitude in any grade has taken place recently. Prices are fluctuating, but the following are the usual quotations, per gross ton, f.o.b. dealers' yards:

Old iron axles	$14.50 to $15.00
Old steel axles	14.50 to 15.00
Old iron rails	13.00 to 13.50
No. 1 railroad wrought	10.00 to 11.00
No. 2 railroad wrought	8.50 to 9.00
No. 1 country wrought	9.00 to 10.00
No. 2 country wrought	8.00 to 9.00
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	8.00 to 8.50
Tram carwheels	9.50 to 10.00
Standard carwheels	10.50 to 11.00
Stove plate	8.00 to 8.50

San Francisco

SAN FRANCISCO, CAL., April 7, 1914.

The general consuming demand has gained appreciably, being more active than at any time since the first of the year, and the aggregate tonnage of steel products moving seems to be about normal. The improvement along distributive lines, however, is confined to the country, as city shop trade remains dull, and there is everywhere a striking lack of vigor and enthusiasm. Conditions might be fairly satisfactory were it not for competitive conditions, which keep resale prices at an unprofitable level. There is also less stability than is desirable in mill prices, and reports of increased foreign offerings cause constant uneasiness. Specifications are coming out well, but new business is light, and contracting for second quarter delivery has not been up to expectations. Many buyers from whom much was looked for are still out of the market, while others are coming in slowly, and merchants continue to work on a hand-to-mouth basis.

Bars.—Sales of soft steel bars have been almost entirely out of stock, and consist to an increasing extent of foreign material. The jobbing movement is seasonably active in most quarters, but neither merchants nor large consumers are disposed to place any additional business ahead of current needs. Many have their requirements covered for some months to come by old contracts for foreign bars. Resale prices are low, and too unsettled to warrant quotations. The tonnage of reinforcing material has been a little better, but prices are low and the local mills are running on a very small scale.

Structural Material.—Local building conditions are improving, the record for private work in March being well ahead of last year. No new lettings of special interest are reported here, but a good tonnage has been booked in this vicinity, including Los Angeles and Portland, Ore., and awards are expected shortly on a number of small jobs. The McClintic-Marshall Company has about 300 tons for a local ferry slip. Bids went in last week for the Firemen's Fund Building, about 400 tons, and figures have just been taken for the general construction of the Kern County jail, which will take considerable steel. Architects Rousseau & Rousseau are taking figures on a seven-story apartment house on Bush street near Stockton, and announce plans under way for a 23-story building at Stockton and Pine streets. Nothing new has been heard as to the Meier & Frank building at Portland or the project at Bush and Montgomery streets, this city.

Rails.—Standard sections have received little attention of late, and while a good many small branch lines and extensions are contemplated, such work is delayed by financial considerations. Sales of light rails have also been somewhat restricted for the last fortnight, but inquiries are numerous, and a fairly large tonnage is expected during the month. Prices continue on an unsatisfactory basis. Bids will be taken April 15 for a lot of special track work for the local municipal railroads.

Plates.—Jobbing business has made little headway, as the local boiler shops, etc., are running at about half capacity and buying little. Specifications from tank manufacturers, however, are coming out freely, and the settlement of a strike of tank builders in the oil fields is a favorable feature. There is little contracting in advance of requirements, but some new business is constantly being booked for special work, and there is still a good tonnage in sight. Some offers are reported of foreign plates at low prices, with guarantee as to quality and condition, but the trade has so far shown little interest.

Sheets.—Current specifications show a gradual but steady increase, in keeping with the seasonable revival of jobbing and consuming trades. Contracts for extended delivery, however, are light, and stocks are kept about as low as possible. The market has been disturbed by offers of price concessions on the part of several mills, which tend to confirm buyers in their waiting policy.

Standard Pipe.—No special inquiries of an important nature have appeared lately, and merchants are buying for current needs only, as the continued cutting of resale prices does not encourage them to increase their stocks. Mill prices are quite well maintained as a rule, but any especially attractive business brings out an easy feeling. The volume of jobbing business is fair, especially in the country.

Cast-Iron Pipe.—Several small municipal inquiries have appeared, and corporation buying is still a rather important factor. Sacramento, Cal., will take bids April 14 for a good-sized lot of pipe, and Santa Cruz will take bids the same day for a few cars of 4-in. pipe. Porterville will open bids April 27 for a small lot, and Eugene, Ore., is out for a moderate tonnage.

Pig Iron.—Conditions show practically no change. Foundry work is dull, and it is estimated that not over half the usual tonnage is being melted. Occasional small arrivals have, in fact, kept almost even with the consumption, leaving unwieldy stocks in importers' hands. No. 2 Southern foundry iron is nominally quoted at about $21 per gross ton, with none arriving and little, if any, offered on the spot. Foreign iron of similar grade is held at about the same level, but liberal concessions might be made to effect large sales.

Coke.—Buyers have shown little interest of late in offers of European coke for current or future loading, and sales from local yards are rather light, the principal movement being on old contracts. German Syndicate coke, ex yard, is still held at about $13 to $14, per net ton.

Old Material.—Extreme dullness prevails in the local scrap market, and holders show more desire to sell than for some time. Cast-iron scrap is moving in a limited way to about $16.50 per net ton, but the demand is slow. Consumers of steel melting scrap are working in a small way and buying practically nothing. Offerings have lately been reported in several quarters at $8 to $9 per gross ton, and it is doubtful whether any large tonnage could be moved at over $7.

St. Louis

ST. LOUIS, MO., April 13, 1914.

Pig Iron.—New business continues in small lots, with an aggregate for the week probably not exceeding 5000 tons. None of the furnaces representatives here has opened for last half business as yet. An inquiry for 500 tons of high manganese is still pending.

Coke.—Sales have been for immediate requirements and at better than generally quoted contract prices. By-product coke is selling at $5.20 to $6.20, St. Louis delivery, according to brand, with very little moving.

Finished Iron and Steel.—Fabricators are insistent on prompt delivery and in many cases are taking material from warehouse, paying warehouse prices. Conditions indicate that no stocks are in yards. In the agricultural implement field stocks are reported as being rapidly cleared up and buying is looked for from this source before long. In bars the demand is for quick shipment and reinforcing material has decidedly improved.

Old Material.—The heavy quantities being dumped by the railroads together with the prices involved indi-

cate the roads are convinced there will be no advance very soon. Lists out this week include 1500 tons from the Terminal Railway, St. Louis; 1000 tons from the Southern Railway for St. Louis delivery and 5000 tons more for other delivery points; 3000 tons from the Missouri-Kansas & Texas, 400 tons from the New Orleans & Northeastern and 1000 tons from the Chicago, Minneapolis, St. Paul & Omaha for St. Louis delivery. We quote dealers' prices, f.o.b. St. Louis, the figures really being largely nominal:

	Per Gross Ton	
Old iron rails	$10.75 to	$11.25
Old steel rails, re-rolling	10.50 to	11.00
Old steel rails, less than 3 feet	10.50 to	10.75
Relaying rails, standard section, subject to inspection	21.00 to	23.00
Old car wheels	10.50 to	11.00
No. 1 Railroad heavy melting steel scrap	9.75 to	10.25
Shoveling steel	8.25 to	8.75
Frogs, switches and guards cut apart	9.75 to	10.25
Bundled sheet scrap	4.50 to	5.00
	Per Net Ton	
Iron angle bars	$10.25 to	$10.75
Steel angle bars	8.50 to	9.00
Iron car axles	16.75 to	17.25
Steel car axles	11.75 to	12.25
Wrought arch bars and transoms	11.25 to	11.75
No. 1 railroad wrought	7.75 to	8.25
No. 2 railroad wrought	7.50 to	8.00
Railroad springs	8.75 to	9.25
Steel couplers and knuckles	8.75 to	9.25
Locomotive tires, 42 in. and over, smooth	9.00 to	9.50
No. 1 dealers' forge	7.25 to	7.75
Mixed borings	3.25 to	3.75
No. 1 busheling	7.25 to	7.75
No. 1 boilers, cut to sheets and rings	5.50 to	6.00
No. 1 cast scrap	9.25 to	9.75
Stove plate and light cast scrap	7.75 to	8.25
Railroad malleable	7.50 to	8.00
Agricultural malleable	7.00 to	7.50
Pipes and flues	5.50 to	6.00
Railroad sheet and tank scrap	5.75 to	6.25
Railroad grate bars	6.75 to	7.25
Machine shop turnings	4.25 to	4.75

Buffalo

BUFFALO, N. Y., April 14, 1914.

Pig Iron.—The market continues to be extremely quiet, with few inquiries and a dearth of new orders, except for very small tonnages. The one encouraging feature is that production is running about equal to normal, being practically 80 per cent. of merchant furnace capacity and iron at this rate of production is going steadily to consumers on existing contracts. Prices remain the same as for the past two or three weeks, being as follows for second quarter delivery, f.o.b. Buffalo, with 25c. per ton extra for Buffalo city delivery:

No. 1 foundry	$14.00 to	$14.25
No. 2 X foundry	13.50 to	14.00
No. 2 plain	13.25 to	13.75
No. 3 foundry	13.00 to	13.25
Gray forge	12.75 to	13.00
Malleable	13.75 to	14.25
Basic	13.75 to	14.25
Charcoal, regular brands and analysis	15.75 to	16.75
Charcoal, special brands and analysis	20.50	

Finished Iron and Steel.—Most selling agencies report heavier specification the last week than for some 30 days, particularly for bar material, reinforcing bars, etc., and there is a growing feeling that there will be an improvement in selling conditions, rather than a continuance of the lull in buying. There is a strong resistance on the part of sellers to make a lower price than 1.20c., Pittsburgh, base, on bars, and the result has been the sale of some sizeable tonnages at this price, and while 1.15c. has been made in a few instances, it was only for desirable specifications and shipment at mills' convenience. The minimum of 1.20c. base for new contracts is now being more firmly held. Bids go in to-morrow to the Eastman Kodak Company, Rochester, for erection of the Canadian Kodak Company's building at Toronto, calling for about 2000 tons of concrete reinforcing bars. Bids go in to-morrow for 1100 tons of steel for the Poppenburg building, Buffalo, and also for 500 tons for the Ward Bakery building, Buffalo. Bids on revised plans for the Fraternal Order of Eagles, this city, requiring 200 tons, and on revised plans for the Broadway Market, Buffalo, 100 tons, are to be taken soon; also for Theatre building for the Mark-Brock Amusement Company, Buffalo, 150 tons, and for Reiman's Dancing Academy, 200 tons, and for the Grand Trunk passenger station at International Bridge, Buffalo, 100 tons. Plans have been completed for the Stratford Theatre, Buffalo, calling for about 400 tons of steel.

Old Material.—The market is extremely dull and the small amount of business transacted has been at prices slightly under last week's quotations. The general opinion among dealers is that the low level has now been reached and a better status is to be looked for shortly, there being some increase in tentative inquiry. We continue last week's price list, as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$10.00 to	$10.50
Low phosphorus steel	14.50 to	15.00
Boiler plate sheared	11.50 to	12.00
No. 1 railroad wrought scrap	11.00 to	11.50
No. 1 railroad and machinery cast scrap	11.50 to	12.00
Old steel axles	13.75 to	14.25
Old iron axles	21.50 to	22.00
Old carwheels	11.50 to	12.00
Railroad malleable	10.25 to	10.75
Machine shop turnings	5.50 to	6.00
Heavy axle turnings	7.50 to	8.25
Clean cast borings	6.00 to	6.50
Old iron rails	15.00 to	15.50
Locomotive grate bars	9.50 to	10.00
Stove plate (net tons)	9.75 to	10.00
Wrought pipe	7.50 to	8.00
Bundled sheet scrap	6.25 to	6.50
No. 1 busheling scrap	8.50 to	9.00
No. 2 busheling scrap	6.00 to	6.50
Bundled tin scrap		10.50

Boston

BOSTON, MASS., April 14, 1914.

Old Material.—The dealers appear to be slightly more hopeful. Actual business is dull, but prices are maintained at the slightly lower level recorded last week. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	$8.25 to	$8.50
Low phosphorus steel	13.75 to	14.75
Old steel axles	13.25 to	13.75
Old iron axles	21.25 to	21.75
Mixed shafting	12.75 to	13.00
No. 1 wrought and soft steel	9.00 to	9.25
Skeleton (bundled)	5.75 to	6.25
Wrought-iron pipe	7.75 to	8.00
Cotton ties (bundled)	6.00 to	6.25
No. 2 light	3.75 to	4.25
Wrought turnings	5.00 to	5.50
Cast borings	5.00 to	5.50
Machinery, cast	11.25 to	11.50
Malleable	8.00 to	8.25
Stove plate	7.75 to	8.00
Grate bars	6.25 to	6.50
Cast-iron carwheels	11.00 to	11.25

New York

NEW YORK, April 15, 1914.

Pig Iron.—It is evident that consumers in many cases took on more iron in the January buying than they are now able to use at the contract rate of shipment. Some of them are laying off men, bringing their scale of operations below that of January. Others are holding up shipments because they have not had the increase in their business which they felt in January was likely to come. Pig iron sellers, with not entirely accurate memories in every case, are saying that the present quietness is more intense than they have ever seen. A good deal of the trouble seems to be that both producers and consumers saw in the January movement a good deal better promise of prosperity than has been borne out by events. A few inquiries have come up which have been withdrawn. One came from Bridgeport, Conn., and was for 2000 tons, but the buyer's idea of price was about $1.50 below present quotations. In New Jersey two lots of 500 tons have been sold and a third inquiry of 500 tons has been withdrawn. The Lackawanna Railroad placed its order for 350 tons for the Scranton foundry with a Buffalo producer. Virginia irons are particularly inactive. Even

the eastern Pennsylvania foundry iron, which one interest has been crowding upon the market, with a good deal of vim in the past few months, is less in evidence because there is little room just now for any maker's iron. Prices are weak. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $15 to $15.25; No. 2 X, $14.75 to $15; No. 2 plain, $14.50 to $14.75; Southern iron, $15 to $15.50 for No. 1 and $14.75 to $15 for No. 2.

Ferroalloys.—Since last report there have been a few sales of 80 per cent. ferromanganese totaling about 150 tons at about $39, seaboard, which is still the prevailing quotation for the English brand. The German product can be bought at $38, seaboard. Inquiries are scarce, even the major portion of the 1200 tons reported last week having been probably withdrawn. Quotations for 50 per cent. ferrosilicon are $73, Pittsburgh, for carloads; $72 for 100 tons and $71 for 600 tons and over.

Finished Iron and Steel.—An index to the situation here is that though the amount involved in building permits filed in March was 16 per cent. more than for the same month last year when all of the country is considered outside of New York City, the amount for March this year, including also this city, is about 1 per cent. less than March, 1913—in short the drop in operations within the city more than offsets the country's gain outside of it. Plates are weakest among finished lines, partly on account of the recent starting of an Eastern plate mill for which orders were sought rather vigorously. Plate sellers are, however, resisting offers of 1.10c., Pittsburgh basis. Bids were opened Tuesday morning for a 66-in. water pipe line in Brooklyn, 12,000 ft. long, involving some 3000 tons of plate work; it is interesting in this connection that a German pipe works made offers to contractors with prices which appear to be not within $5 as low per ton as American unit quotations. It is thought that two of the large tug boats for the Isthmian Canal Commission will be built in Staten Island and two by Navy Yards. The market has more generally settled to 1.15c., Pittsburgh, but there are contracts with jobbers being closed at 1.20c., Pittsburgh, partly for reasons noted last week. Store prices are lower and bar iron also. It now appears that the Southern Pacific so-called inquiry for cars is merely a feeler and the car market is exceptionally dull. About the only purchases are 10 tank cars for the Magnolia Cotton Oil Company, taken by the American Car & Foundry Company, and 17 passenger cars for the Southern Pacific, taken by the Pullman Company. The Missouri, Kansas & Texas is inquiring for 100 tank cars; the St. Paul for 26 passenger cars, and the Atlantic Coast Line for 100 flat cars; the Louisville & Nashville desires 1400 underframes for existing cars. Railroad offerings in the structural field include 300 tons additional for the New York Central; 600 tons for the Southern Railway and 200 tons for the Pennsylvania. It is expected that bids will shortly be taken for 1800 to 2000 tons for an addition to the Metropolitan Museum of Art and the Soo Line is to build a 20-story building in Minneapolis. Some of the work closed includes 1000 tons for the Scollay Building, Boston, to the New England Structural Company; 600 tons for the Charleston & Northern (Seaboard Air Line) to the American Bridge Company; 500 tons for the Methodist Episcopal Building, Philadelphia, to the Eastern Steel Company; 250 tons for the Melrose Telephone Exchange to the Bethlehem Steel Company; 900 tons for the Commercial Trust Building addition, Jersey City, to the Belmont Iron Company; 300 tons for the Atlantic Coast Line, to the American Bridge Company, and 800 tons for the Bridgeport high school to the Phoenix Iron Works. The 700 tons for the Hippodrome, Baltimore, was given to Harris-Silvers-Baker Company, Brooklyn. According to the Bridge Builders' and Structural Society, which held a meeting in New York, April 10, 76 per cent. of the entire capacity of bridge and structural shops of the country was contracted for in March, as shown by reports collected by its secretary. We quote mill shipments of steel bars, plates and structural material at 1.15c. to 1.20c., Pittsburgh, or 1.31c. to 1.36c., New York, and iron bars, 1.22½c. to 1.30c., New York.

Cast-Iron Pipe.—Public lettings are not numerous. Quincy, Mass., opens bids to-day on 450 tons of 4 to 8 in. The sewer commissioners of Manchester, Mass., will open bids on about 500 tons of 14-in. to-morrow, April 16. Birmingham, Mass., will open bids April 20 on 620 tons of 20-in. The general demand is holding up quite well but competition for this class of business is still keen. Carload lots of 6-in. continue to be quoted at $22 to $23 per net ton, tidewater.

Old Material.—Moderate quantities of heavy melting steel scrap have been sold at $11, delivered at works in eastern Pennsylvania. Steel companies generally, however, are not in the market and some of them are making difficult the delivery of material on old contracts. Rejections are numerous and requests are being received to postpone shipments. Rolling-mill stock is exceedingly quiet. A few small transactions are noted in cast scrap, but foundries generally take little interest in the market. Dealers' quotations are largely nominal, being continued as follows, per gross ton, New York:

Old girder and T rails for melting	$8.25 to $8.75
Heavy melting steel scrap	8.25 to 8.75
Relaying rails	21.50 to 22.00
Rerolling rails	10.50 to 11.00
Iron car axles	18.50 to 19.00
Steel car axles	12.50 to 13.00
No. 1 railroad wrought	10.50 to 11.00
Wrought-iron track scrap	9.50 to 10.00
No. 1, yard wrought, long	8.75 to 9.25
No. 1, yard wrought, short	8.25 to 8.75
Light iron	3.25 to 3.50
Cast borings	5.75 to 6.25
Wrought turnings	5.75 to 6.25
Wrought pipe	8.25 to 8.75
Carwheels	10.50 to 11.00
No. 1 heavy cast, broken up	11.00 to 11.50
Stove plate	8.00 to 8.50
Locomotive grate bars	6.50 to 7.00
Malleable cast	7.75 to 8.25

British Conditions Unimproved

(*By Cable*)

LONDON, ENGLAND, April 15, 1914.

Holiday influences are dominant. The coal position is unsettled. Active blast furnaces number 169 against 171 last week and 207 a year ago. Nothing is doing. Stocks of pig iron in Connal's stores are 113,121 gross tons, against 115,543 tons a week ago. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 12s. 10½d. ($3.13), against 13s. ($3.16) a week ago.

The following prices are per ton of 2240 lb.:

Cleveland pig-iron warrants (Tuesday), 50s. 10½d. ($12.37), against 51s. 4½d. ($12.50) a week ago.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 51s. ($12.41), against 51s. 9d. ($12.59) a week ago.

Hematite pig iron, f.o.b. Tees, 62s. ($15.09).

Steel sheet bars (Welsh), delivered at works in Swansea Valley, £4 10s. ($21.89).

Steel bars, export, f.o.b. Clyde, £6 ($29.20).

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £5 12s. 6d. ($27.37).

Steel ship plates, Scotch, delivered local yards, £5 17s. 6d. ($28.59).

Steel black sheets, No. 28, export, f.o.b. Liverpool, £8 15s. ($42.58).

Steel rails, export, f.o.b. works port, £5 12s. 6d. ($27.37), against £5 15s. ($27.98) a week ago.

The following prices are per export ton of 1015 kilos, equivalent to 2237.669 lb.:

German sheet bars, f.o.b. Antwerp, 79s. ($19.22).

German 2-in. billets, f.o.b. Antwerp, 75s. ($18.25).

German basic steel bars, f.o.b. Antwerp, £4 8s. ($21.41).

German joists, f.o.b. Antwerp, £5 2s. to £5 5s. ($24.82 to $25.55).

The freight rate from Antwerp to New York is about 8s. ($1.95) per ton on semi-finished steel. Rates from Liverpool to Boston are 10s. ($2.43) on semi-finished steel and 12s. 6d. to 15s. ($3.04 to $3.65) on finished steel.

German Trade Disappointing

BERLIN, April 3, 1914.

Everywhere it is admitted that the improvement looked for in the spring business has not been realized, apart from a somewhat increased activity in structural shapes. The outlook for the future, too, is regarded as by no means promising. Consumers are buying very cautiously, many taking only from month to month what they require. The belief begins to find expression in the trade that no substantial improvement in business is to be looked for this year. The price movement is still downward.

At a meeting of the Pig Iron Syndicate several days ago it was reported that the demand from foundries was still normal, and that the open-hearth steel plants had contracted for their requirements for this quarter. It was admitted, however, that in some cases smaller amounts were taken than usual. The Syndicate announces that the foreign demand for iron is rather active, and private reports mention that the organization has recently taken some good foreign orders at slightly better prices. The trade in scrap is very dull and prices are weak.

New business in steel rails continues to come in, and the mills are well employed. It is reported that the Prussian railroad minister, in the negotiations with the Union for the new government contracts for heavy rails, is trying to force the price down to 108 marks ($25.70), as against a present price of 118 marks ($28.08). The Union, however, has hitherto refused to make so low a price and is holding out for 114 marks ($27.13).

In steel tubing the ruinous price war continues unabated, and there are no indications that it will soon reach an end. The trade organization in cast-iron pipe has just been renewed for five years.

The rod mills are doing better than most other sections of the trade, running on full time. The position in wire is reported to be pretty good, but wire nails are suffering from continued overproduction.

Metal Market

NEW YORK, April 15, 1914.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
April	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
9	14.87½	14.55	36.75	3.80	3.67½	5.27½	5.12½
9	14.87½	14.55	36.95	3.80	3.67½	5.27½	5.12½
10	14.75	14.50	36.95	3.80	3.67½	5.27½	5.12½
11	14.75	14.50	36.90	3.80	3.67½	5.27½	5.12½
13	14.75	14.45	36.95	3.80	3.67½	5.25	5.10
14	14.75	14.37½	36.40	3.80	3.67½	5.25	5.10

Copper is dull and lower. Tin has declined in the absence of demand. There is no activity in lead but prices have held up. Spelter is a little lower and weak. Antimony continues dull and unsatisfactory as regards price realized by sellers.

New York

Copper.—Following an easing up of demand and lower prices in Europe there has been a decline here this week. Previous to the decline abroad this market began to show signs of being topheavy, and in the last week business has been very dull, consumers showing no interest. Efforts to sell brought out the fact that many resale lots could be had at concessions from the prices of the larger agencies. While these lots are small individually, they consist in the aggregate of much more copper than is wanted. First hands are still holding ostensibly to 14.75c., delivered, 30 days, but the resale lots referred to can be had at 14.37½c., cash, New York, and possibly lower. The demand for brass and copper products is poor and there is a feeling in the trade that the recent advances in prices of the metal were not well advised, the effort to send the market up being too rapid. Lake copper is practically nominal at 14.75c. to 15c., according to brands. The London quotations to-day are £64 6s. 3d. for spot and £64 12s. 6d. for futures. Exports this month total 13,131 tons.

Tin.—Since the last report it is estimated that less than 300 tons has been sold in this market. At least a part of the inactivity was due to the closing of the London Metal Exchange from Thursday last, on which day only one session was held, until Tuesday, while the local exchange was closed Friday and Saturday on account of the Good Friday holiday. It was expected that the end of the holidays might bring an accumulation of orders but the looked for buying did not materialize. The London spot quotation to-day is the lowest of this year. It is £164 10s., as compared with £167 a week ago. The quotation for futures is £166 10s. The decline abroad and consequently here is accredited to the view which Europe takes of the Mexican situation and the status of the American iron and steel trade. Stocks are well controlled, but all of the holders are anxious for business, even though prices are below the import cost, especially those for futures. The New York quotation yesterday was 36.40c. The arrivals of tin this month total 2598 tons and there is afloat 2160 tons.

Lead.—The market is dull and to some extent a drifting one, inasmuch as buyers were well filled up after the recent recessions in price. Some of the independent producers are willing to take business while others are satisfied to go along without looking for it. The New York quotation is unchanged at 3.80c. and that at St. Louis, 3.67½c.

Spelter.—Slightly lower prices are quoted and these are weak, reflecting a lessened demand from the makers of galvanized sheets who themselves are receiving fewer specifications. Next to tin plate, sheets have kept up about the best of any of the iron and steel products, but a falling off is now apparent. The New York price is about 5.25c. and that at St. Louis, about 5.10c., although 5.05c., St. Louis, might be done.

Antimony.—The quotation for Hallett's is a little lower at 6.75c. to 6.95c. In cases some dealers have declined business at under 7c. on the ground that such sales would entail a loss. Cookson's is quoted at 7.20c. to 7.25c. and Chinese and Hungarian brands, 5.75c. to 6.25c.

Old Metals.—Very little business is being done. Dealers' selling prices are nominally unchanged as follows:

	Cents per lb.
Copper, heavy and crucible	13.75 to 14.00
Copper, heavy and wire	13.25 to 13.50
Copper, light and bottoms	12.75 to 13.00
Brass, heavy	9.00 to 9.25
Brass, light	7.75 to 8.00
Heavy machine composition	12.25 to 12.50
Clean brass turnings	8.75 to 9.00
Composition turnings	11.25 to 11.50
Lead, heavy	3.75
Lead, tea	3.50
Zinc scrap	4.25

Chicago

APRIL 13.—Despite the fact that an excellent statistical position gives promise of a bullish movement in copper, actual advances in price lag behind. Trading in tin continues on the basis of last week's market. Transactions in all metals are of little importance. We quote as follows: Casting copper, 14.50c. to 14.75c.; Lake copper, 15c., for prompt shipment; small lots, ¼c. to ½c. higher; pig tin, carloads, 38c.; small lots, 40c.; lead, desilverized, 3.75c., and corroding, 4c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.20c.; Cookson's antimony, 9.50c. for cask lots; other grades, 8c.; sheet zinc, $7, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 12c.; copper bottoms, 11c.; copper clips, 11.25c.; red brass, 11.25c.; yellow brass, 8c.; lead pipe, 3.50c.; zinc, 3.50c.; pewter, No. 1, 23c.; tinfoil, 27c.; block tin pipe, 31c.

St. Louis

APRIL 13.—The metal market has been rather quiet but firmed up a little toward the end of the week, the close being for lead 3.70c. to 3.72½c.; spelter, 5.10 to 5.12½c.; Lake copper, 15.35c.; electrolytic copper, 15.10c.; tin, 37.20c. to 37.45c.; Cookson's antimony, 7.60c. The Joplin ore market was weaker, with basis range $35 to $40 per ton, but the best lots sold on

a 60 per cent. metal basis brought $43. Calamine was sluggish and off at $16 to $18, with the choicest selling at $24. The best price obtainable for 80 per cent. lead ore was $45. Miscellaneous scrap metals are quoted as follows: Light brass, 6.50c.; heavy yellow brass, 8c.; heavy red brass and light copper, 10c.; heavy copper and copper wire, 11c.; zinc, 3.50c.; lead, 3.50c.; tea lead, 3c.; pewter, 26c.; tinfoil, 31c.

Iron and Industrial Stocks

NEW YORK, April 15, 1914.

The long period of dullness and the unsatisfactory business prospects have at length had their logical effect, and prices of most stocks have receded considerably. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com..	10⅛- 12¼	Nat. En. & St., c.	11⅛- 11½
Allis-Chal., pref.	43 - 45	Pittsb'h Stl., pref.	88½- 89
Am. Can, com..	27⅜- 29⅝	Pressed St'l, com.	41⅞- 43⅜
Am. Can, pref..	90¼- 92	Ry. Spring, com.	26½- 28¼
Am. Car & Fdy., com.	49¾- 50⅝	Ry. Spring, pref.	95⅝- 96
Am. Car & Fdy., pref.	116	Republic, com...	22¼- 23¾
Am. Loco., com.	31¾	Republic, pref...	83⅝- 88
Am. Loco., pref.	100 -100⅜	Rumely Co., com.	6½- 10
Am. Steel Fdries.	30⅛- 32½	Rumely Co., pref.	21 - 27¼
Bald. Loco., com.	47 - 48	Sloss, com.	30⅛
Bald. Loco., pref.	107⅞-108⅛	Pipe, com.	12⅜
Beth. Steel, com.	37⅝- 41	Pipe, pref.	40 - 41
Beth. Steel, pref..	82¾- 84¾	U. S. Steel, com..	57⅞- 63½
Case (J. I.)	85¼	U. S. Steel, pref.	109 -110½
Colo. Fuel.	28¾- 32	Va. I. C. & Coke	45 - 46¼
Deere & Co., pref.	92¾- 94	Westg'h'se Elec..	71⅞- 74½
General Elec.	145 -146	Am. Ship, com...	32 - 39½
Gt. N. Ore Cert..	30⅝- 34	Chic. Pneu. Tool	57 - 57½
Int. Harv., com..	102¼-105½	Cambria Steel...	48 - 49¾
Int. Harv., Corp.	101½-101¾	Lake Sup. Corp.	21
Lack. Steel.	32¾- 34¼	Cruc. Steel, com.	15 - 15⅛
		Cruc. Steel, pref.	91 - 91½
		La Belle Iron, c..	38¾- 39⅝

Dividends Declared

The Emerson-Brantingham Company, regular quarterly, 1¾ per cent. on the preferred stock, payable May 1.

The Ingersoll-Rand Company, regular annual, 5 per cent. on the common stock, payable April 30.

The Willys-Overland Company, regular quarterly, 1½ per cent. on the common stock, payable May 1.

The American Shipbuilding Company passed the quarterly dividend on its preferred stock.

The Delaware River Steel Company, Chester, Pa., has sold for dismantling that part of the old Tidewater steel plant not in operation. The property sold consists of two rolling mills, open-hearth furnaces, blooming mill, gas producer plant, power plant, etc. The sale was made through the Church Engineering Company, Philadelphia. The Tidewater plant, earlier known as the Wellman plant, was an important one in the steel industry until closed down in 1902. The Delaware River Steel Company bought the property four years ago, but has operated only the blast furnace and coke ovens. The price received is not disclosed, though it is known that the company held this part of the plant at $100,000.

The Ideal Electric & Mfg. Co., Mansfield, Ohio, has recently shipped 32 25-hp., 440-volt, three-phase, 25-cycle squirrel case induction motors to the Duluth, Missabe & Northern Railway. These motors, which will operate at a speed of 750 r. p. m., will be used in connection with the new iron ore docks at Duluth, Minn. These docks are reported to be the largest iron ore docks in the world, and each motor will operate a bank of 24 chutes.

L. Vogelstein & Co., 42 Broadway, New York, furnish the following figures of German consumption of foreign copper in January and February, 1914: Imports, 35,873 tons; exports, 1440 tons; consumption, 34,433 tons. The consumption in the same period of 1913 was 30,875 tons. Of the above 1914 imports 30,902 tons came from the United States.

The Foot-Burt Company, Cleveland, Ohio, maker of single and multiple spindle drilling machines and bolt cutters, has opened an office at 436 Wells Building, Milwaukee, Wis. Charles Gordon has been placed in charge.

OBITUARY

FREDERICK ELWELL WOODBURY, vice-president Newport Mining Company, was killed by an accident at Ironwood, Mich., on January 21, 1914. He was born at Nashua, N. H., April 7, 1862. He went to the Lake Superior copper country in 1881, entering the service of the Calumet & Hecla Mining Company in the civil engineering department, remaining there until 1884. He then spent two years as a special student at Massachusetts Institute of Technology. Returning to Calumet he became assistant mining engineering at the Calumet & Hecla. From 1890 to 1892 he was employed by Ferdinand Schlesinger as mining engineer at the Chapin iron mine, Iron Mountain, Mich., then for four years was with the Calumet & Hecla, and from 1896 to 1898 was mine manager at Ironwood for the Schlesinger interests. Between 1898 and 1900 he had charge of experiments at the Calumet & Hecla stamp mills. His work there resulted in greatly modifying and improving milling practice in the Lake Superior copper country. The Woodbury system of concentration was developed in this period. In 1900 he renewed his connection with Ferdinand Schlesinger, which continued until his death. He took an active part in the development of the Newport mine and of the coke oven plant of the Milwaukee Coke & Gas Company. Perhaps the most important work which he undertook in this connection was the design and installation of a plant for the preparation and mechanical loading of foundry coke into box cars. Experimental work showed that it would be necessary to abandon practically everything that had been used and begin anew. Many unexpected obstacles were encountered, which would have meant failure to a man of less determination. However, in accepting each new, unsatisfactory development in the light of a lesson, success finally attended several years of effort, and he gained for himself the reputation of having developed the most complete mechanical arrangement for preparing and loading foundry coke in the United States. He made careful investigations of many mining properties in this country, Canada and Mexico, for which work he was specially well fitted. Under his supervision preliminary plans for the development of a coal property in Mexico had recently been completed.

ANDREW JACKSON DULL died at his home in Harrisburg, Pa., April 8, aged 84 years. He was born at McVeytown, Mifflin County, Pa., and was educated at Tuscarora and Strasburg academies and Princeton, graduating from the latter in 1852. For years he was identified with the construction of various public works, notably the aqueduct at Washington, and the Chicago water works. In 1863 he assisted in forming the firm of Reese, Graff & Dull, which erected rolling mills in Pittsburgh and manufactured various products. It rolled plates used as armor for monitors for the United States Navy during the last years of the civil war. With Robinson, Rea & Co. this firm formed the Graffton Iron Company, which built and operated furnaces at Leetonia, Ohio. In 1871, having retired from the Pittsburgh firm, he became general manager of the Lochiel Rolling Mills, Harrisburg, and was also identified with the Lochiel Furnace Company, of the same city. He then became president of the Pulaski Iron Company, Pulaski, Va., and the Electric Ore Separator Company, Pittsburgh. Other companies with which he has been connected include the Chicago & Western Indiana Railroad Company, Virginia Mining Company, Empire Lumber Company, Tidewater Cement Company, Corpus Christi, San Diego & Rio Grande Railroad Company, Kansas City, Topeka & Western Railroad Company, Pulaski Mining Company, and Norfolk & Western Railroad Company. He was prominent in local affairs, having been president of the Harrisburg Club, Harrisburg Country Club and other organizations, a manager of the Harrisburg Hospital and interested in various civic and charitable organizations.

JAMES KERNS, at one time a prominent iron and steel merchant, died at his home in Brooklyn, N. Y., April 9, aged 70 years.

STEEL TRADE CONDITIONS

President Clarke on Unfavorable Factors—Wage Reductions Discussed

President E. A. S. Clarke, of the Lackawanna Steel Company, in an interview given to the New York Sun last week, makes plain the seriousness of the situation created by the diminished buying power of the railroads and refers to the effect on wages in the steel industry, of the present combination of untoward conditions. Mr. Clarke said:

"At present the outlook in the steel industry, not only for our company, but for all the steel companies, is an exceedingly gloomy one. With the tariff militating against us and further talk of hostile legislation in Washington I can see few signs of improvement. Of course the increase in freight rates would help a great deal, but unless the roads do get the desired increase I do not see how matters are going to be bettered.

"I say 'desired' increase, for I don't believe that a qualified increase which would give the railroads part of the advance they need and advise further economies to cover the remainder would help a great deal. The railroad business forms a large part of the steel industry, and at present the railroads are not purchasing steel to an amount anywhere near normal.

"The Lackawanna Steel Company is operating at a scant 50 per cent. of its normal capacity. The company is employing about 3000 less men than it usually does at this season of the year, and those employed are only working part time."

In answer to the question as to whether wage reductions had been considered Mr. Clarke said that it had, and that this was true in the other companies as well.

"It is felt," he said, "that while the men are being paid the highest wages in this country of any in the steel industry a reduction should not be made if it can be avoided, owing to the high cost of living. Besides the men are only working part time now and the amount they take home in their pay envelopes totals less than their salaries under normal conditions. It isn't good economics, though, to continue the present wage scale if conditions remain as they are now. The number of unemployed is constantly increasing and there are thousands of men who would be only too glad to get work. Conditions such as exist at present are only hard on Americans. The foreigner scuttles back to Europe, where he gets something to do or lives on what he has earned here until business revives. I have seen this happen before."

Mr. Clarke admitted that the country was beginning to realize that tariff changes and anti-trust legislation are proving a curse rather than a benefit. "I want to be fair to the present administration," he said, "but if it hopes to succeed itself it must cease this hasty and ill advised legislation which is so detrimental to business."

"Regarding the railroads and their buying of steel," Mr. Clarke said, "I have no doubt that the railroads will be heavy buyers of rails and equipment provided they get the 5 per cent. increase in freight rates. I am told on good authority that in many railroad offices there are piles of sealed orders awaiting release as soon as the rate increase is given. I am also told that those orders will not be released unless the Interstate Commerce Commission grants the railroad's plea."

Mr. Clarke said that as yet he did not greatly fear buying of foreign steel by railroads, as foreign works are not fitted to turn out the equipment our roads here need.

From the Youngstown Viewpoint

President James A. Campbell, of the Youngstown Sheet & Tube Company, is thus quoted by the Youngstown Telegram on the present situation and the possibility of wage reductions:

"That we will be forced to cut wages is now almost a certainty. As a matter of fact some smaller concerns have already made reductions and the larger ones have held off only because they believed the necessity of reductions might be avoided. Many steel mills, however, are not making a profit on steel manufactured, while few if any are meeting fixed expenses. Tariff reductions are largely responsible for this. There are other contributing factors of course. Within the past few months the tariff changes have been overlooked by the country in general, but their effect is now being felt. Naturally some time would be required for foreign steel makers to prepare for competition in the United States, but their selling agencies are now at work and foreigners are reaching into American territory from seaboard points. To meet this competition we must reduce labor costs as we cannot pay protective tariff wages on a free trade basis."

Chairman Topping, of the Republic Iron & Steel Company, who was in Youngstown all of last week, was interviewed by the same paper on the possibility of wage reductions and said that it was a matter of common knowledge that such reductions are now being made in a number of lines, and particularly by the smaller manufacturers of iron and steel.

"Wage reductions are also in progress abroad, notably in England," he said, "and when consideration is given to the fact that wage schedules abroad prior to the reduction were from 40 per cent. to 60 per cent. below those in effect here the difficulties of the American manufacturer should be quite apparent, particularly in view of the fact that local steel makers are seriously handicapped with freight rates to the sea coast as against cheap water rates from abroad. With the liquidation of labor under way by employers abroad, under existing tariff conditions, wage schedules now in force among the larger manufacturers of iron and steel cannot be maintained.

"The reductions that have been made effective outside of this district have been based on 15 cents per hour for common labor. The wage schedules of the Amalgamated Association of Iron, Steel and Tin Workers, which are based on a sliding scale of selling prices, have been automatically reduced, so that the local producers of steel products are not only confronted by cheaper iron costs, but also by a lower cost of steel, due to lower steel rates for labor in outside steel producing districts.

"Youngstown's position will be further intensified should the expected general advance in railroad rates be made, as competition west, east and south, due to the higher freight burden, will be made more difficult, and it will also be made more difficult to meet foreign competition at the sea coast.

"In my opinion there are a number of causes for the present depression in business, but the present tariff has unquestionably intensified what might otherwise have been an unsatisfactory condition of business."

Western Structural Steel Contracts

CHICAGO, ILL., April 15, 1914.—(*By Wire.*)—The additional Crane Company buildings, of which mention was made in *The Iron Age* of April 2, were awarded last week to the South Halsted Street Iron Works, the contract calling for 2622 tons. The Llewellyn Iron Works will furnish 2348 tons for the Commercial Building at Los Angeles. Other contracts awarded last week in the West were quite numerous, but for quantities running not larger than 475 tons, the total being 7600 tons. Despite this good aggregate, the market for structural shapes has declined to the basis of 1.33c., Chicago, for any business exceeding 100 tons, although prices are not so extreme in the outlying territory as they are within the city.

Heat-treated chrome-vanadium tires on some switch engines of a large railroad up to February last had made 22,084 constructive miles with a maximum tread wear of 5/32 in., or 8830 miles per 1/16 in. Up to the same period carbon steel tires had made 16,000 constructive miles with a maximum tread wear of 7/32 in., which is 4570 miles per 1/16 in. of maximum wear.

The net surplus of freight cars as reported by the American Railway Association for April 1 was 139,512, against 124,865 on March 15 this year, and 57,988 on April 1, 1913.

PERSONAL

R. T. Hodgkins, formerly with the Yale & Towne Mfg. Company and more lately New York manager for the Studebaker Brothers Company of New York, has been appointed assistant general sales manager of the Studebaker Corporation of America, automobile division, Detroit, Mich. He left New York for Detroit April 14. The position he held in New York will be filled by H. B. Edwards.

C. S. Koch, manager of the Fort Pitt Steel Castings Company, Pittsburgh, will present a paper before the Cleveland Metal Trades Superintendents' and Foremen's Club, Cleveland, Ohio, April 18 on "Some Features of the Manufacture of Small Steel Castings." At the club's annual election, held at the last meeting, B. D. Fuller, Westinghouse Electric & Mfg. Company, was elected president and Samuel Bolton, Chandler & Price Company, vice-president. F. W. Seberlin, Hill Clutch Company, was re-elected treasurer and Philip Frankel, secretary.

W. D. B. Alexander, president National Screw & Tack Company, Cleveland, Ohio, arrived home April 15 from a ten weeks' tour through Europe.

W. C. Carroll, assistant general manager of sales, and D. M. Buck, chief chemist, of the American Sheet & Tin Plate Company, Frick Building, Pittsburgh, have returned from a six weeks' business trip, which extended to most of the Eastern cities and as far west as the Pacific coast.

Walter H. Smith, formerly chief chemist and designer of the Harris Automatic Press Company, Niles, Ohio, has resigned and is now chief chemist of the Miller Saw Trimmer Company, Pittsburgh.

Charles M. Schwab, president Bethlehem Steel Corporation, South Bethlehem, Pa., will be one of the speakers at the Grant birthday dinner to be held in the Hotel Schenley, Pittsburgh, on the evening of April 27.

The Sivyer Steel Castings Company, Milwaukee, Wis., announces the appointment of M. F. Doty as sales manager. He was formerly Western sales manager for Isaac G. Johnson & Co., Spuyten Duyvil, N. Y., with headquarters in Chicago.

F. T. Snyder, chief engineer of the Metallugrical Engineering Company, Chicago, addressed the Milwaukee Engineering Society on "The Practicability of Electric Furnaces" at its monthly meeting April 8.

The J. I. Case Threshing Machine Company, Racine, Wis., has appointed John Pugh, Jr., superintendent of its new South works, erected in 1913 and now in partial operation. He is a graduate of the University of Wisconsin, college of engineering, and has been associated with the Case Company for several years.

Jonathan R. Jones is vice-president and treasurer of the Alan Wood Iron & Steel Company, Philadelphia, and not secretary and treasurer, as was stated on page 932 of *The Iron Age* of April 9.

M. A. Coolidge, Fitchburg Machine Works, Fitchburg, Mass., arrived in New York April 9 after a few weeks spent abroad.

F. William Jaeger, representative of Alfred H. Schutte, Cologne, Germany, is again in his office at 90 West street, New York, after an absence of five weeks. He broke a leg in a fall on a sidewalk in the last big storm of the winter.

Harold Smith, who for several years has been secretary and purchasing agent of the Racine Mfg. Company, Racine, Wis., has resigned and on April 20 will become vice-president of the B. G. & M. Mfg. Company, Chicago, manufacturer of brass and aluminum castings and metal stampings, and jobber in all kinds of machine work.

Charles F. Seelbach has been elected president of the Forest City Foundry & Mfg. Company and the Walworth Run Foundry Company, Cleveland, Ohio, succeeding the late William Strangward. He will continue to hold the offices of secretary and treasurer of both companies. P. J. Strangward has become general manager of the Forest City Company; Fred Hoehn, vice-president, and W. T. Strangward, assistant secretary and treasurer. W. J. Strangward has become manager of the Walworth Run Company. A. Gerdum is vice-president.

E. Mühlinghaus, Walzmaschinenfabrik Schmitz, Düsseldorf, Germany, has returned to Europe after a stay here of several weeks.

Frederick Robinson, for 15 years vice-president of the J. I. Case Threshing Machine Company, Racine, Wis., has resigned and intends to spend several years in foreign travel.

E. C. Welborn, formerly assistant treasurer of the Allis-Chalmers Mfg. Company, Milwaukee, Wis., has been elected assistant manager of the credit department of the Illinois Steel Company, with headquarters at the Bay View mills in Milwaukee.

S. H. Reck, secretary of the Rockford Drilling Machine Company, Rockford, Ill., has resigned to become associated with the Greaves-Klusman Tool Company, Cincinnati, Ohio, in the capacity of secretary and treasurer.

I. E. Jones, formerly in charge of the sales department of the Brownell Company, Dayton, Ohio, has been appointed general manager of the company.

H. C. Frick sailed for Europe Wednesday on the Imperator.

George H. Allen, American Brass Company, Kenosha, Wis., was elected president of the Manufacturers' Association of Kenosha at the annual meeting last week. Other officers elected are: Vice-president, Walter J. Frost, Frost Mfg. Company; secretary-treasurer, Conrad Shearer; Executive board, W. W. Vincent, Vincent-Alward Company; Z. G. Simmons, Simmons Mfg. Company; Charles T. Jeffery, Thos. B. Jeffery Company; C. C. Allen, and F. C. Hannahs. The association consists of 12 of the largest manufacturers of Kenosha. It operates an employment bureau and is otherwise helpful to local manufacturers. Clubrooms are maintained and a most satisfactory spirit of cooperation has been developed among the local employers.

The Falls Rivet Company, Kent, Ohio, has been organized with a capital stock of $155,000 to take over the business of the Falls Rivet & Machine Company. It will make rivets, bolts and nuts. The plant will be under the management of Roy H. Smith, who for the past seven years has been general superintendent of the National Screw & Tack Company, Cleveland. Mr. Smith will also be secretary and treasurer. Theophilus King, Boston, Mass., is president and M. G. Garrison is vice-president. Mr. King is also president of the Falls Clutch & Machinery Company, Cuyahoga Falls, Ohio.

The Pacific Ornamental Iron Works, Inc., 1942-1946 South Main street, Los Angeles, Cal., intends to build a completely new shop which will have approximately 45,000 sq. ft. of floor space. The factory is to be modern in every respect, and the company desires to hear from manufacturers of machinery and appliances that can be used to advantage in the production of ornamental iron, brass and bronze work. Alfred J. Bayer is president and treasurer and James F. Rothgeb is vice-president and secretary.

The Dearborn Chemical Company has transferred its southeastern branch office from Birmingham, Ala., to Atlanta, Ga., 1407 Candler Building, where C. H. Everett and J. F. Boutelle, representing the company in that territory, will have their headquarters.

Albert C. Wall, Jersey City, N. J., has been appointed co-receiver with Howard H. Williams, New York, of the assets in this district of the Standard Plunger Elevator Company, Worcester, Mass.

Pittsburgh and Nearby Districts

The regular monthly meeting of the Pittsburgh Foundrymen's Association was held in the Fort Pitt Hotel Monday evening, April 13, at 7 o'clock, preceded by a dinner. An address was delivered by Dr. John A. Brashear of the Allegheny Observatory and of John A. Brashear & Co., Ltd., makers of astronomical instruments.

At the Fort Pitt Hotel, Pittsburgh, on Thursday and Friday, April 9 and 10, the American Institute of Electrical Engineers held a meeting under the auspices of the Committee on Use of Electricity in Mines and the Pittsburgh section of the Institute, of which Wilfred Sykes and A. M. Dudley, of the Westinghouse Electric & Mfg. Company are the chairmen. In view of the fact that the use of electricity in mines has only of recent years become of importance in the industry, rules covering its application have not been standardized, and one of the main features of the convention was the discussion of this subject.

The partnership existing between D. F. H. McDowell of Pittsburgh, Pa., and James E. Cochran of Bradford, Pa., doing business as dealers in new and used machinery under the firm name of McDowell & Co., Pittsburgh, Pa., was dissolved April 1, Mr. Cochran retiring. Mr. McDowell will continue the business under the old firm name.

The Riter-Conley Mfg. Company, Pittsburgh, has received an order from the Indian Refining Company, New York City, for 48 storage tanks to be erected in the East, to require about 250 tons of plates; from the Aluminum Ore Company, East St. Louis, for four precipitator tanks with supports, the tanks to be 20 ft. in diameter and 65 ft. high; from the Pittsburgh Steel Company, Monessen, Pa., for ore trestles and limestone bins, requiring 250 to 275 tons of plates and shapes; from the Solvay Process Company, Syracuse, N. Y., for a steel stack, flue and breechings, the stack to be 17 ft. in diameter and 200 ft. high.

The Asbestos Protected Metal Company, Beaver Falls, Pa., has removed its Pittsburgh office to 1611 Bennedum-Trees Building, with H. E. Marks continuing as district manager. Besides Asbestos protected metal for roofing and siding, this company now manufactures a complete line of prepared roofing and shingles to meet the requirements of all kinds of buildings.

The Pittsburgh Iron & Steel Foundry Company, Midland, Pa., has recently installed several large Morgan electric cranes to handle heavy castings and also to take care of its rapidly growing demand for Adamite rolls. The company is now arranging to connect up its two main buildings, making one building 150 ft. wide by 900 ft. in length. Additional roll lathes, an 86 in. x 86 in. x 35 ft. planer and a 48-in. engine lathe are being installed and other changes are being made in the plant to increase production. The new ingot mold department is working to full capacity. The company states that in the manufacture of Adamite rolls no pig iron containing alloys is used, but a special alloy metal invented by J. Ramsey Speer, president of the company.

The plant of the Charleston Electrical Supply Company, Charleston, W. Va., has been burned with a loss of $125,000.

Among recently authorized Pennsylvania corporations are the following: Mathews Gravity Carrier Company, Ellwood City, Pa.; capital, $200,000; treasurer, Fred F. Winchester. Erie Scrap Iron Company, Erie, Pa.; capital, $15,000; treasurer, H. T. Mentzer. Adams Bros. Mfg. Company, stoves, Pittsburgh; capital, $50,000; treasurer, J. F. Adams. Charles M. Hough Mfg. Company, brass, Franklin, Pa.; capital, $80,000.

The Lawrence Steel Casting Company, New Castle, Pa., has filed notice that it has increased its stock from $40,000 to $100,000.

The Central Scrap Iron Association, organized at Pittsburgh a month or more ago, and of which John C. Bole, First-Second National Bank Building, was president, has been abandoned. The reason given is that several of the large dealers in this district refused to be identified with the association and without their support it could not be made successful. It is possible that efforts will be made later to revive it.

On Tuesday, April 7, Edgar Thomson furnace I and Duquesne furnace No. 1 of the Carnegie Steel Company were blown out for relining and repairs. This company now has 39 blast furnaces active and 20 idle.

The Builders Iron & Steel Company, recently organized at Pittsburgh, and of which H. Sellers McKee, a glass manufacturer, is president, will build a plant at Dravo Station near McKeesport, Pa. E. M. Butz & Co., architects and engineers, Park Building, Pittsburgh, will draw plans for the new works, which are to cost $230,000. The company proposes to fabricate steel shapes and will also build rolling-mill machinery and steel concrete stairs.

The Lawson Mfg. Company, Pittsburgh, maker of valves and fittings, has completed plans for its new works to be located on Thomas boulevard. The main building will be 50 x 250 ft., three stories, and there will be an office building 20 x 30 ft.

The Mercer Planished Steel & Iron Company, Mercer, Pa., will apply for a Pennsylvania charter with a capital of $100,000, one-half preferred and one-half common stock. The company proposes to build a plant to cost about $70,000 and has elected the following directors: J. T. Reznor, Herman Frankel, W. J. Logan, F. P. Filer, F. P. Craig, J. M. Campbell and Q. A. Gordon, all of Mercer; J. A. Viquesney, Bellington, W. Va., and J. H. Crago, Wheeling, W. Va. W. J. Logan has been chosen treasurer.

The Westinghouse Machine Company, East Pittsburgh, is building up a large business in steam turbines and the Westinghouse-Melville-MacAlpine reduction gears of small horse power capacity. It has recently secured a number of orders for these small machines to be used in connection with the operation of steam pumps for municipal power plants, where the installation of this combination of apparatus is particularly advantageous.

The new by-product coke-oven plant of the Republic Iron & Steel Company, Youngstown, Ohio, is about completed and will be lighted next week. The plant has 68 ovens, with a daily capacity of about 1000 tons of coke. This output, with what the company produces in its beehive ovens in the Connellsville region, will make it self-contained in coke and independent as a buyer in the outside market. The superintendent of the new plant is Caleb Davies, Jr., formerly with the Algoma Steel Company, Sault Ste. Marie, Ontario.

The No. 1 furnace of the Shenango Furnace Company at Sharpsville, Pa., was blown out last week. The stack will be made higher, the bosh enlarged and other improvements made, so that the capacity will be increased from 350 tons to about 500 tons of pig iron per day. The three furnaces of the company will then have a capacity of 1100 to 1200 tons per day.

All seven of the open-hearth furnaces in the new plant of the Brier Hill Steel Company, Youngstown, Ohio, are now in operation, the seventh having been started last week. This company has two blast furnaces at Youngstown, namely, Tod and Grace. The former is out of blast while the latter is making basic iron for the open-hearth plant.

The property of the Sunshine Coal & Coke Company at Lynn Station, Fayette County, Pa., comprising 180 acres of coal land, 142 beehive coke ovens, etc., will be offered at trustees' sale May 9. On May 16 the property of the company at Martin Station, Fayette County, Pa., comprising 450 acres of coal land and 240 beehive ovens, will be offered at trustees' sale.

Arthur G. McKee, engineer, Cleveland, Ohio, has taken an order from the New Russia Company for a distributor for its No. 1 furnace at Jusofka, Russia. This is the third order for a furnace distributor received by Mr. McKee from Russia.

The Wagner Electric Mfg. Company, St. Louis, Mo., has opened a branch office at Syracuse, N. Y. It is located in suite 524, Syracuse University Block, and is in charge of J. W. Bryant.

Low Sulphur Converter Steel Castings

An Important Modification of Regular Practice by Which a Basic Reaction Is Secured in a Vessel with Acid Lining

BY EDWIN F. CONE

High sulphur is the bête noir of the producer of converter steel castings. Any process that will reduce the sulphur content will command attention. The average commercial product of foundries making steel castings by the use of the side-blow converter contains from 0.060 to 0.095 per cent. sulphur. The principal source of this contamination is the coke used in the cupola and, unless there is great care in the selection of both the coke and the raw materials it is not possible to produce a low sulphur metal by the ordinary practice. It can be done, but only at a prohibitive expense.

The production of small steel castings in side-blow converters has increased rapidly in recent years, largely supplanting the same size poured in open-hearth metal. This has been due to the rapid advances in the general quality of the converter metal and to the fact that some plants, devoted solely to the small castings branch of the industry, have been able to give better service in the matter of deliveries. The quality has so greatly improved that the tests now obtained by some of these plants are equaling and even surpassing those obtained by the average open-hearth steel foundry. This is true, even with a high sulphur content.

Just how detrimental sulphur is in steel for steel castings is a debatable point. It is likely that it may cause red shortness, resulting in cracks or checks in the castings which necessitate patching or welding. But even this is doubtful in many cases. Many good sound castings have been and are being made that are high in sulphur. The checking may be due to other causes. Steel foundry men are divided on this question. There may also result an increased amount of manganese sulphide, weakening the crystalline structure. However this may be, some of the buyers of steel castings have come to the conclusion that sulphur above certain limits is objectionable and have adopted specifications to which the producers must live up in order to secure their business. Only recently the Navy has incorporated a sulphur specification in its requirements, though it had not considered it necessary formerly. Its latest specifications call for an upper limit of 0.05 per cent. sulphur. Many of the railroads have the same requirement. It is evident that these steps have developed a situation that renders it extremely difficult for many foundries to obtain some desirable orders.

Spurred on by an incentive not only to overcome this difficulty and improve the metal but also to make a specialty of Navy and high grade specification steel castings, a converter foundry in the Chester, Pa., district has developed a process of making low sulphur side-blow steel castings. The Eagan-Rogers Steel & Iron Company, Crum Lynne, Pa., has so modified the regular converter practice that it is able now to hold down the sulphur in its steel to practically any desired limit so as to meet even the most stringent specifications. This has been done by the use of certain slags and also by the method of manipulating the converter. The developers of the process have succeeded in producing and carrying on a basic reaction in an acid converter of the Stoughton type, and thus reducing the sulphur content approximately 40 per cent. below that usually obtained in regular practice. Considerable skill and care are required in carrying out the details of the process which naturally are not revealed here. The expected cutting of the lining of the converter is controlled and a dependable practice has been developed.

Table of Results of Specially Blown Converter Steel

Date of blow	Carbon, per cent.	Phosphorus, per cent.	Manganese, per cent.	Silicon, per cent.	Sulphur per cent.	Tensile strength, lb. per sq. in.	Elastic limit, lb. per sq. in.	Elongation in 2 in., per cent.	Reduction of area, per cent.	Cold bend, 1 in. by ½ in., deg.
Feb. 2, 1914.....	0.14	0.036	0.62	0.270	0.047	68,500	47,000	33.0	54.9	180
Dec. 26, 1913.....	0.22	0.050	0.63	0.250	0.045	82,000	58,500	24.5	42.2	180
Dec. 23, 1913.....	0.16	0.050	0.59	0.250	0.047	76,000	45,500	27.5	52.8	180
Dec. 4, 1913.....	0.16	0.040	0.62	0.235	0.032	77,500	49,000	26.5	53.1	180
Nov. 25, 1913.....	0.18	0.043	0.64	0.245	0.034	80,000	55,500	24.0	48.0	180
Oct. 13, 1913.....	0.15	0.046	0.57	0.262	0.048	73,500	53,000	31.0	51.1	180
Sept. 26, 1913.....	0.14	0.039	0.59	0.260	0.030	75,500	51,000	26.0	47.2	180
Aug. 1, 1913.....	0.16	0.048	0.73	0.330	0.050	78,000	50,000	28.5	44.6	180

In addition to this the company claims to have been able, by several new developments in the process, to make its steel nearly constantly uniform and one so close grained that it gives unusual physical results, high in elastic limit and elongation. The table here presented shows some chemical and physical results of special blows by the new process. An average sulphur content of 0.042 per cent. is obtained from eight blows. The general uniformity of the carbon, manganese and silicon content is noticeable, equaling steel made by other processes where regulation is easier.

Germany Making More Steel Than Pig Iron

The Verein Deutscher Eisen und Stahlindustriellen, which has for years been making up the regular monthly statistics of pig-iron production, has now begun to publish monthly reports on steel production in Germany, says our Berlin correspondent. The striking feature of the January and February figures, which were published April 2, is that they show that Germany for the first time is making more steel than pig iron. Last year's production of steel had fallen somewhat short of pig iron (18,935,000 metric tons of steel and 19,309,000 tons of pig iron), but in January the steel production amounted to 1,586,600 tons, or 20,000 tons more than that of pig iron, while in February there was a total of 1,486,600 tons of steel, or about 40,000 tons more than pig iron. The figures for the leading classes in February were as follows: Basic (Thomas) steel, 821,522 tons; basic open-hearth, 577,921 tons; Bessemer, 8705 tons, and electro-steel, 7300 tons.

American Shipbuilding Company

In connection with the passing of the quarterly dividends on the preferred stock of the American Shipbuilding Company, the directors announce that when disbursements are resumed they will be paid on a semi-annual basis. This action is taken because it has been found that the business of the company is of such a nature that it is not possible to determine the exact profits quarterly. In a statement to the stockholders the directors say in part:

"Notwithstanding the depression of the business on the Great Lakes, the net earnings of the company, actually earned up to date and conservatively estimated for the remaining three months, would undoubtedly be sufficient to pay the 7 per cent. dividend to the preferred holders for the fiscal year ending June 30, but as there have been certain losses in construction on contracts taken prior to the beginning of this fiscal year, but not completed until subsequent thereto, and therefore not ascertainable until such completion, it has been decided to pass the dividend on the preferred stock for the balance of the fiscal year. This will enable the company to start the new year with these losses completely wiped out."

The statement reports that a careful appraisal of the properties has been completed which has shown the values placed on the properties by the appraisers in excess of the company's book value. In the last six months the liabilities of the company have been reduced approximately $725,000. Quick assets are reported in excess of liabilities and the entire assets of the company, after deducting all liabilities and the book valuation of patents and good will, show a surplus in excess of the entire capitalization.

Lackawanna Company's Quarterly Statement

The unsatisfactory condition of the steel trade is strikingly indicated by the statement of earnings of the Lackawanna Steel Company for the three months ended March 31, 1914, which has just been issued. This statement shows that the quarter's operations resulted in a deficit of $445,207.09, as against a profit for the corresponding quarter of 1913 of $742,520.22. The company sold some of its property in the first quarter of 1913 for $267,200.90, which made the total net income for that quarter $1,009,721.12. The statement for both quarters is as follows:

	1914	1913
Income from operating after deducting all expenses incident thereto, including ordinary repairs and maintenance of plants and interest on bonds and fixed charges of subsidiary companies	$154,995.63	$1,386,028.09
Proportion of earnings on investments in companies not controlled, and of other annual income	81,051.35	217,516.52
Total	236,046.98	1,603,544.61
Deduct interest on Lackawanna Steel Company bonds and debentures	437,424.98	437,478.48
Balance	—201,378.00	1,166,066.13
Less charges and appropriations as follows:		
Sinking funds on bonds and exhaustion of minerals	36,860.33	107,668.29
Depreciation and accruing renewals	206,968.76	315,877.62
Profit or deficit	*445,207.09	742,520.22
Profit on sale of capital assets of subsidiary companies		267,200.90
Total profit or deficit	*$445,207.09	$1,009,721.12

*Deficit.

Unfilled orders March 31, 1914, were 191,828 gross tons, against 623,816 tons March 31, 1913.

The Reading Iron Company is relining its Crumwold furnace at Emaus, Pa., and has about completed a new equipment of Roberts three-pass stoves for this furnace. Frank C. Roberts & Co., Philadelphia, are the engineers.

The Brown Hoisting Machinery Company, Cleveland, Ohio, has taken an order for two locomotive cranes for shipment to the plant of the Tata Iron & Steel Company, Ltd., in India.

Ingersoll-Rand Company's Annual Report

The annual report of the Ingersoll-Rand Company, covering the operations for the year ended December 31, 1913, states that the earnings, before charging depreciation, were $2,017,900, which compares with earnings of $2,508,608 in 1912. The surplus, after deductions for depreciation, interest and dividends on preferred and common stock, was $826,965, against a surplus for the previous year of $1,436,218. In addition to a cash dividend of 5 per cent., a stock dividend of 25 per cent. was given to the holders of the common stock. The surplus, which was $2,384,513 January 1, 1913, was thus reduced to $1,517,603 January 1, 1914. The income account and condensed balance sheet are as follows:

INCOME ACCOUNT

Earnings for 1913 and ordinary income from investments		$2,017,900.01
Depreciation set up as reserve against capital assets	$375,821.14	
Depreciation applied directly to reduction of capital assets	219,890.96	595,712.10
Net earnings		$1,422,187.91
Interest on bonds, 5 per cent	$100,000.00	
Dividend on preferred stock, 6 per cent	151,518.00	
Special reserve in respect of patents and licenses	5,000.00	256,518.00
Balance, per annexed balance sheet		$1,165,669.91

CONDENSED BALANCE SHEET

Assets		
Real estate, equipment, etc. (including patents, licenses, etc., $655,000.00)		$7,964,652.06
Investments in manufacturing companies, including treasury stock		1,607,450.00
Total capital assets		$9,572,102.06
Inventories of raw materials, material in process, finished and consigned stock		5,280,605.93
Accounts receivable		2,222,312.00
Bills receivable		279,220.01
Agents' cash balances		38,071.08
Marketable securities, including treasury bonds (at market values)		1,181,334.25
Cash at banks		984,495.55
Deferred charges to income		8,893.53
Total		$19,567,034.41
Liabilities		
Preferred stock		$2,525,500.00
Common stock		8,469,400.00
First mortgage bonds		2,000,000.00
Total capital liabilities		$12,994,900.00
Accounts payable		567,259.50
Bond interest accrued		50,000.00
Preferred stock dividend, payable January 1, 1914		75,759.00
Bills payable		626,000.00
Depreciation reserve		2,350,101.11
Patents and license reserve		655,000.00
Special inventory reserve		730,412.00
Surplus—As at January 1, 1913	$2,384,512.89	
Less—Dividends, common stock: Stock—25 per cent.	$1,693,875.00	
Cash—5 per cent.	338,705.00	
	2,032,580.00	
	$351,932.89	
Income account, balance for year per annexed account	1,165,669.91	
		1,517,602.80
Total		$19,567,034.41

A Record at an Anthracite Furnace

The Thomas Iron Company blew out on April 11 the one furnace of the Alburtis, Pa., group, which has been in operation for some months. The March product, 1972 tons, broke all records of this anthracite furnace since its erection in 1867. The greatest weekly output was 459 tons, for the week ending March 20, while the greatest output for a day was 82 tons on March 20. An I. P. Morris blowing engine built in 1868 has been in continuous use at this furnace. The blowing out of the Alburtis stack leaves only one of the company's furnaces in operation, a stack at Hokendauqua. The curtailment led to the shutting down of a section of the company's Richard iron mine at Wharton, N. J.

Pig iron was successfully made in an electric furnace in the foundry room of the Carnegie Institute of Technology, Pittsburgh, on April 3. The experiment was in charge of Frederick Crabtree, professor of metallurgy, and the iron was made in a 100-hp. furnace, with a capacity of 2000 lb. per 24 hr., tested by professors and students of the institute.

SONS.
Mechanical and Civil Engineers,
PITTSBURGH, PA.

Record Figures in March Copper Report

The monthly statement for March of the Copper Producers' Association shows the stock of copper on hand April 1 to be 64,609,319 lb. This is a decrease of 13,762,533 lb. from that of the previous month, the amount on hand March 1 being 78,371,852 lb. The statement of the association for March compares as follows with that of February:

	March, pounds	February, pounds
Stock of marketable copper of all kinds on hand at all points in the United States at the first of the month	78,371,852	87,296,685
Production of marketable copper in the United States from all domestic and foreign sources in the month	145,651,982	122,561,007
Deliveries of marketable copper in the month:		
For domestic consumption	69,852,349	47,586,657
For export	89,562,166	83,899,183
Total	159,414,515	131,485,840
Stock of marketable copper of all kinds on hand at all points in the United States at the close of the month	64,609,319	78,371,852

The features of the report are the large production and export figures, establishing a record in each case. The production for March of 145,651,982 lb. exceeds by 23,461 lb. the previous high record for August, 1912. The domestic deliveries of 69,852,349 lb. exceeded those of February by 22,265,692 lb. Since the average home consumption for the last four months has been only approximately 41,000,000 lb. per month, the March consumption of nearly 70,000,000 lb. is cause for encouragement.

The Ingersoll-Rand Company, 11 Broadway, New York, announces the opening of a new branch office and warehouse in the Union Oil Building, Los Angeles, Cal., in charge of W. A. Townsend, formerly manager of the company's El Paso office. J. D. Foster succeeds Mr. Townsend at El Paso. The company has also opened a branch in Juneau, Alaska, under the immediate charge of Frank Carroll. Walter A. Johnson, formerly of Atlanta, Ga., has been appointed pneumatic tool manager of the Pittsburgh branch of the company and C. F. Overly, formerly of Pittsburgh, pneumatic tool manager of the Cleveland branch.

The production of the Dominion Steel Corporation for the fiscal year ended March 31 shows a large falling off in the production of wire rods. The statement compares with the previous year as follows:

	1913-14. Tons	1912-13. Tons
Coal	5,026,645	5,053,160
Ore received	810,821	704,542
Pig iron	334,101	321,020
Steel ingots	331,349	343,251
Rails	176,505	174,802
Wire rods	30,778	53,323
Bars	16,736	451
Wire products, etc.	32,414	10,962
Shipments	246,256	287,591

The Dauch Mfg. Company, Sandusky, Ohio, recently incorporated with a capital stock of $800,000, and which has taken over the plant of the Auto Parts Company, has effected its organization with the election of the following officers: President and general manager, J. J. Dauch; vice-presidents, A. F. Knotts and L. L. Curtis; secretary and assistant manager, George A. Schwer; treasurer, Sidney Frohman; sales manager, Daniel E. Storms. The company will build tractors and motors for pleasure and commercial cars.

The Interstate Commerce Commission, by an order entered April 8, suspended from April 10 until August 8, 1914, the operation of the Chicago, Burlington & Quincy Railroad tariff containing schedules increasing rates applicable to the transportation of agricultural implements in carloads from certain points in Missouri to Sioux Falls, S. D. The rates were to be increased from five points in Missouri—Chillicothe, Edina, Green City, Tarkio and Wheeing—per 100 lb., 1c., 1c., 1c., 9½c. and 13c., respectively.

Canada's Tariff Changes

More complete advices relative to the changes to be made in Canadian tariff duties on metal products enable us to present the following details:

Rolled iron or steel angles, beams, channels and other rolled shapes and sections of iron or steel not punched or drilled or otherwise further manufactured, weighing over 120 pounds per lineal yard not otherwise provided for, not square, flat, oval or round shapes, and not being railroad bars or rails, changed from $2, $2.75 and $3 to $2, $3, and $3 per ton under British preferential, intermediate and general tariffs, respectively.

Aluminum leaf reduced from 27½ per cent. to free.

Ferrosilicon made $4.50 a ton instead of $2.50.

Ferromanganese and speigeleisen changed from $2.50 a ton to free.

Galvanized hoop steel changed from 30 per cent. to $7 per ton, general tariff.

Wrought or seamless iron or steel tubing, from 4 to 10 in. in diameter, changed from 10, 12½ and 15 per cent. to 20, 30 and 30 per cent.

Wrought or seamless iron or steel tubing over 10 in. in diameter, changed from 10, 12½ and 15 per cent. to 10, 15 and 15 per cent.

Coil chain and links 1⅛ in. in diameter and over, changed from 5 per cent., 7½ and 10 per cent. to free, 5 per cent. and 5 per cent.

Coil chain and links under 1⅛ in., changed from 5, 7½ and 10 per cent. to 15, 20 and 20 per cent.

Malleable sprocket chain or link belting chain made free when used in agricultural implements, whereas it was formerly free for all purposes.

Mowing machines, harvesters, self-binders and reapers changed from 12½, 17½ and 17½ per cent. to 12½ per cent. on all three tariffs.

Parts for traction ditching machines, formerly dutiable, made free.

Electric dental engines changed from free to 15, 27½ and 27½ per cent.

Rolled round wire rods, in the coil, of iron or steel, not over ⅜ in. diameter, changed from free to $2.25, $3.50 and $3.50 per ton, when imported to manufacture wire in the coil; for use in the manufacture of chain, changed from free to $2.25, $3.50 and $3.50.

Iron and steel sections for hames and saddlery hardware placed on the free list, where formerly they paid a general tariff of $7 per ton.

Parts of corset clasps and wires transferred to the free list where formerly dutiable in the general tariff at 3 per cent.

Industrial Relations Exhibit in New York

An exhibition of better industrial relations is to be held in New York City, April 18 to 25, at 2 West Sixty-fourth street, under the auspices of the Business Men's Group of the Society for Ethical Culture. Among the members of the advisory committee are C. L. Close, United States Steel Corporation; F. R. Hazard, president Solvay Process Company; Dr. Charles P. Neill, American Smelting & Refining Company; N. O. Nelson, president N. O. Nelson Mfg. Company, St. Louis; John H. Patterson, president National Cash Register Company; Prof. Herman Schneider, University of Cincinnati; C. A. Prosser, secretary National Society for the Promotion of Industrial Education; Dr. E. E. Pratt, manager, industrial bureau, Merchants Associations of New York; Oswald Villard, New York Evening Post, and Dr. Winthrop Talbot, New York. Meetings are scheduled for 8 p. m. as follows: April 20, arbitration and conciliation; April 22, industrial betterment; April 24, industrial education.

Greaves, Klusman & Co., Cincinnati, Ohio, manufacturers of machine tools, have reorganized under the name of the Greaves-Klusman Tool Company, capitalized at $150,000. The following are the officers of the company: President, C. H. M. Atkins; vice-president and general manager, W. A. Greaves; secretary and treasurer, S. H. Reck. No extensions to the company's present plant are now planned.

Book Reviews

Prosperity and How It Must Come. By Roger W. Babson, Wellesley Hills, Boston, Mass. Published by Babson's Statistical Organization, 5 Congress street, Boston. Pages, 120, 5¼ x 7¾ in.; cloth. Price, 50 cents.

The author of this book is the president of Babson's Statistical Organization, and the natural presumption from the title would therefore be that business men were to be shown by a study of statistics, trade conditions, financial and political influences, etc., how prosperity might be brought about through some application of business principles. The work, however, seeks to inculcate religious principles, the author contending that prosperity is a matter of religion rather than of business. The book is divided into three sections. In the first, the subject of taxation is taken up and an analysis is made of the mistaken ideas on which taxation is based. The second section treats of the interrelation of religion and prosperity, showing that it is the prosperity of the nation as a whole which all should seek and not that of any particular class. The third and closing section presents what the author claims to be the only solution, which is that of training children so that they would be taught unselfishness and the development of character. Nations, churches, schools and individuals, the author states, must recognize the fundamental importance of encouraging character, production and conservation or else all will fail. Upon the churches and schools the real burden falls. These must teach that each person shall earn, spend and invest his time and money with the sole purpose of accomplishing the greatest good. In the same way the relations of nations are taken up, the author believing that the greatest need of today is the acceptance by the nations of a new standard founded on character, intelligence, production and conservation in the settling of international disputes. With such a standard, he says, a change will be caused throughout the national, educational and home life which will produce a prosperous, healthy and happy people—a result that is the goal and intention of all governments. The book is highly altruistic.

The Engineering Index Annual—1913. Pages, 510. 6¼ x 9¼ in. Edited and published by the Engineering Magazine, New York. Price $2.

Appearing a little more than six weeks after the close of the year it covers, this volume makes a record for promptness in putting before the engineering world an index to the literature contained last year in 250 technical publications in seventeen nations and colonies and six languages. Three-fourths of these journals are printed in English. Additions made in the last year are the Proceedings of the Institution of Mining Engineers and the Faraday Society. What has been a particularly valuable feature of the Engineering Index Annual is its groupings of articles under the great divisions of engineering practice—civil, mechanical, electrical, mining, etc. Then there are sub-groups according to the divisions in each field. The arrangement under each section is alphabetical. The painstaking work represented by the monthly index which has so long been a feature of the Engineering Magazine is particularly commendable and the annual volume is noteworthy for its thoroughness as well as its timeliness.

The Fitting and Erecting of Engines. By C. Leslie Browne. Pages xii + 153, 5¾ x 8½ in.; illustrations, 114. Published by Emmott & Co., Ltd., Manchester, England. Price, 3s. 6d. (85 cents).

The steady improvement in machine tools and the work done by machine tools has brought about a condition by which engine fitters do less and less actual fitting, and their work gradually is becoming merely that of assembling the various parts; but even the mere assembling of parts of large stationary or marine engines necessitates some high grade men of this class.

Starting with bedplate sections as they come from the pickling tanks, this book points out the small details; how carelessness in removing scale from a casting may, months afterward, cause untold trouble in the oil in the crank race. Considerable emphasis is laid on the bearings, including the different styles of scrapers used and clearance in the bearings, while the use of center lines and trammels is pointed out. The erection work is carried forward from the bedplates to the bearings on the main shafts, from the cylinders to the piston rods and cross-heads, and through all the intricate corrections to alignment, up to the completely assembled engine, equipped with its soft or metal packing and with its oil holes plugged ready for shipment. Considerable space has been devoted to keys and keyways and the old millwright's methods of fitting keys. The book concludes with a chapter on outside erecting, including the carting and lifting tackle, up to the writing of reports and the returning of tools. It is a book of interest to the engine fitter and a great deal of information for the erecting shop foreman and stationary engineer.

Design of Plate Girders. By Lewis E. Moore, B.S.C.E. Pages viii + 283, 6 x 9 in.; illustrations, 82; tables 40. Published by McGraw-Hill Book Company, New York. Price $3.

A book for the structural steel draftsman and the railway bridge designer. The work is the outcome of the author's experience as teacher of bridge design at Massachusetts Institute of Technology, and as a member of the Massachusetts Railroad Commission. He has endeavored to teach the student to understand the limitations of rules and to grasp the elements surrounding girder designs.

The problem of bridges is briefly outlined in the first chapter to show the part which the girders are called upon to perform and the stresses to which they are subjected by various designs and live loads. Box girders, deck plate girders and through plate girders are explained and illustrated in detail, with a chapter on rivets and riveted joints, showing the reasons for the difference in the practice of the boiler maker and the structural engineer. The general specifications of the New York, New Haven & Hartford Railroad Company for railroad bridges are embodied in the book; also 40 tables covering such points as rivet spacing, thickness of angles, web equivalent, etc.

As the title implies, the book covers girder problems only, no attempt having been made to take up the subject of trusses and other points included in bridge design.

How To Build Up Furnace Efficiency. By Joseph W. Hays. Seventh edition. Pages 126, 5 x 7¼ in. Published by Joseph W. Hays, Rogers Park, Chicago. Price $1.

The efficiency of the steam boiler furnace is discussed in five chapters, viz.: Why fuel is wasted; how fuel is wasted; how to "spot" fuel wasted; how to stop fuel wastes; and how to keep the wastes stopped. An attempt has been made to write the book in such plain language, intermingled with witticisms, as to make it interesting reading to the boiler house engineer and fireman. As its title states, it devotes itself entirely to the efficiency of the furnace, taking up the B.t.u. losses that occur in fuel from the time it is mined until it has gone out of the boiler either with the ash or with the burnt gases.

The author claims that in the average boiler house of the country, one-quarter of the fuel is wasted and points out the loss by air leakage in boiler settings, by scale in the tubes and soot on the tubes, the loss of combustible matter in the ash and the loss in handling fuel. To remedy this, he advises that one should keep his boiler clean from scale and from soot; and recommends permanent blowers for blowing the soot. Draft gauges are recommended for keeping track of the amount of air. Cracks in the settings, it is emphasized, should be repaired. The latter part of the book is pretty much devoted to the importance of gas analysis, gas collectors, CO_2 recorders and draft gauges.

Iron ore exports from Spain in 1913 were 8,907,202 tons, exceeding the previous high record of 8,635,868 tons in 1907 and 437,828 tons greater than those of 1912.

The Machinery Markets

Quiet as the markets have been in recent months, showing now and then some improvement, they are at present even quieter than heretofore and more generally so. Nearly every machinery manufacturing and selling center is affected by at least a temporary lessening of interest on the part of buyers. New York has received unpleasant news stating that the Seaboard Air Line list of shop equipment is to be not only deferred but curtailed. The trade in New England is depressed, buying is of a hand-to-mouth character and many men are out of work, but there are a few bright spots. Some improvement is shown in spots in Cleveland, but as a rule that market is dull, the single tool demand having eased off. No betterment is felt in Cincinnati, some sellers find less inquiry and exports are only moderately good. Inquiries, while small individually, have increased in volume in Detroit and the shops and foundries are somewhat busier. Signs of improvement are few in Chicago, industrial requirements are below normal and the meager railroad business placed has been at unsatisfactory prices. In the central South machinery lines are slow. Large industrial enterprises are conservative in St. Louis and business is at low ebb. Birmingham is dull, but the crop reports are promising for future activity. In Texas the demand for irrigating machinery is the one good feature. Dealers in the Pacific Northwest are forwarding considerable mining machinery to Alaska, but the lumber demand is unsatisfactory and this is having a detrimental effect on machinery.

New York

NEW YORK, April 15, 1914.

Sales in this territory are fewer. No one finds business good, the volume of trade being made up of moderate-sized scattered sales which are the culmination of much hard work. New inquiry is coming out slowly, mostly for one or two tools. Some buying has been done recently by the Adriance Machine Works, Brooklyn. This company is planning the erection of a new shop and temporarily will occupy space in the new building of the New York Dock Company, Brooklyn. Local railroad buying is still practically at a standstill, although the Havana Central Railroad Company of Cuba has an inquiry out for two or three machine tools, including a horizontal boring and turning machine, electrically driven, 230 volts, direct current. It is to have a 4½-in. spindle and 5-ft. table. Estimates are wanted on the machine complete with motor and without motor. The inquiry was issued from the office of the company at 42 Broadway. The trade does not hear pleasing news with regard to the list issued some months ago by the Seaboard Air Line and it now appears that the good buying by this road which was looked for may not materialize until July and that it then will be considerably curtailed. The list had progressed to the office of the president when the order was given that it should be revised, new bids asked for and the ultimate expenditure be kept down to about $70,000. The original list would have run well over $100,000.

The Phoenix-Hermetic Company, 194 Chambers street, New York City, is having plans prepared for a four-story and basement reinforced concrete factory building which is to erected at Thirty-eighth street and Fourteenth avenue, Brooklyn. The present factory at the Chambers street address and a lithographing plant now in operation at the Bush Terminal, Brooklyn, will be consolidated in the new structure which will have a total floor space of 100,000 sq. ft. A gas producer will be installed to furnish the heat required for some of the manufacturing processes. Group motor drive will be employed for the tools, but the question of whether the power required will be purchased or an isolated plant installed has not been definitely decided. It is not expected that any considerable amount of new machinery will be needed. The estimated cost of the new building is $150,000. William P. Miller, 1181 Broadway, New York City, is the architect.

H. Haussling, Newark, N. J., manufacturer of soda water, etc., is building a factory at 56 Arlington street at an estimated cost of $20,000. Jacob Haussling is in charge.

The Haussling Soda Apparatus Mfg. Company, 24 Arlington street, Newark, N. J., manufacturer of carbonators, etc., is building a factory at 60 Arlington street at an estimated cost of $20,000.

Plans are being prepared by P. Tillion & Son, 381 Fulton street, Brooklyn, for a one-story brick foundry, 100 x 100 ft., for the Franklin Brass Foundry, 102 Varick street, Brooklyn. M. J. Reilly is the owner.

The Spicer Mfg. Company, Plainfield, N. J., manufacturer of universal joints for motor vehicles, has purchased some eight machine tools, covering its recent requirements.

Bids are being taken for the new plant at Easton, Pa., of the Taylor-Wharton Iron & Steel Company, High Bridge, N. J., covering the following buildings: A foundry 130 x 464 ft., machine shop, 300 x 400 ft., grinding shop, 120 x 400 ft., blacksmith shop, 110 x 320 ft., pattern shop 120 x 200 ft., two pattern storage buildings, each 50 by 120 ft., as well as a power plant, offices and auxiliary structures.

The town of Palmyra, N. Y., is preparing to build a pump house and provide sand filter equipment for the waterworks. Bonds will be issued for the purpose. J. N. Todd is president of the town board.

The city of Hornell, N. Y., is having plans prepared for a sewage disposal plant to cost approximately $50,000. F. H. Robinson is superintendent of public works.

A boiler house, 38 x 50 ft., is to be built and equipped for the Infants' Summer Hospital, Charlotte, N. Y. Mortimer Miller, Wilder Building, Rochester, N. Y., is chairman. The Gorsline & Swan Construction Company, Rochester, has the general contract.

The Western Engineering & Mfg. Company, Utica, N. Y., recently incorporated, will erect a fireproof factory, 50 x 130 ft.

An addition is to be made to the power plant of the Union Springs Light & Power Company, Union Springs, N. Y. One 150-kw. generator and two 40-kw. transformers will be installed.

The E. J. Knapp Candle Company, Syracuse, N. Y., has commenced work on an addition to its factory.

The Peerless Case Works, Inc., Elmira, N. Y., has been granted articles of incorporation to manufacture boxes, furniture, etc. The capitalization is $25,000. The directors are E. C. Lawton, J. J. Eyre and L. R. Schrenck, of Elmira.

The Fulton Company, Gloversville, N. Y., J. E. Jones, manager, has let contract for an addition to its silk mill, 45 x 48 ft., three stories, and a new building, 48 x 96 ft., three stories and basement, to cost with equipment about $30,000.

The L. G. Denton Co., Inc., Schenectady, N. Y., has filed incorporation papers to manufacture patent medicines, etc. The capitalization is $25,000. The incorporators are L. G. Denton, E. R. Clough and L. S. Sebring, Schenectady.

The Columbia Rope Company, Auburn, N. Y., will erect a five-story and basement storehouse, 120 x 120 ft., reinforced concrete and brick.

The Buffalo Metal Goods Company, Buffalo, manufacturer of coaster brakes and bicycle and automobile parts, is having plans prepared for a new factory 72 x 145 ft., to be built at Fillmore and Winchester avenues, near Northland avenue. W. F. Emerson, 865 Lafayette avenue, is president.

The Utica Steam & Mohawk Valley Cotton Mills, Utica, N. Y., are installing new equipment.

The power house of the Deposit Electric Company, Deposit, N. Y., destroyed by fire April 2, is to be rebuilt.

The Binghamton Bridge Company, Binghamton, N. Y., recently organized, will be incorporated with a capitalization of $100,000. It will erect two manufacturing buildings from plans now being prepared. Harold L. Hart, Binghamton, is attorney for the company.

It is announced that the plant of the Ontario Knitting Company, Oswego, N. Y., is to be remodeled and new machinery installed.

The Silver-Chamberlain Company, Clayton, N. Y., has been incorporated with a capital stock of $50,000 and will erect a factory for the manufacture of brushes, etc. E. W. Chamberlain, and others, are the incorporators.

The Ward Brothers Company, Rochester, has let the general contract for a two-story addition, 85 x 125 ft., to its bakery, at a cost of $75,000.

The Journal & Courier Company, Little Falls, N. Y., is taking bids for a two-story addition to its printing plant. George G. Stebbins is president.

The six-story addition, 100 x 200 ft., to be made to the mill of Stephen Sanford & Sons, Amsterdam, N. Y., is nearing completion and will soon be ready for equipment.

The Meyer, Foote & Dayton Company, 15 North Union street, Rochester, N. Y., has let the general contract for a two-story addition to its factory.

The Henry C. Schmeer Company, Rochester, N. Y., has commenced construction of a 50 x 100-ft. box factory.

John G. Rock, Mark D. Stiles and Edward M. Benford, Mt. Vernon, N. Y., have incorporated the Volute Spring Shock Absorber Company with a capital stock of $100,000. Arrangements are being made for the equipment of a factory for the manufacture of a patented shock absorber for automobiles.

Fownes Brothers & Company, Amsterdam, N. Y., will add a story to its glove factory, 42 x 125 ft.

The city of Oswego, N. Y., has voted $110,000 of bonds for sewerage extension.

Philadelphia

PHILADELPHIA, PA., April 13, 1914.

The Schwarz Spring Company, 928 Witherspoon Building, Philadelphia, Pa., has been incorporated by Henry Hess, and others, for the manufacture of automobile springs, cushion truck wheels, etc. The company has increased its capitalization from $10,000 to $200,000, and has purchased a factory at Tioga and Memphis streets. Orders have been placed for the initial equipment. Charles L. Schwarz is general manager.

N. L. Cook, director of public works, Philadelphia, Pa., will receive bids until April 28, for pumping machinery, boilers, tanks, etc.

The Birdsboro Steel Foundry & Machine Company, Birdsboro, Pa., has started extensive improvements at its plant, including the installation of traveling cranes, alterations to the annealing pit, etc.

The town of West Hazleton, Pa., has voted $30,000 of bonds for constructing a sewer system.

The Luzerne Rubber Company, Trenton, N. J., will build a two-story brick addition to its factory. N. K. Bugbee & Co., Trenton, are the architects.

The Olden Rubber Mfg. Company, Trenton, N. J., will erect a factory of brick construction, at an estimated cost of $10,000, for the manufacture of rubber specialties, etc. D. W. Lovett is manager.

Brehm & Stehl, Trenton & Allegheny avenues, Philadelphia, dyers, are building a three-story engine house, 24 x 40 ft., of brick construction. They will install a 100 kw. direct-connected generator set, about 10 motors, pumps, etc.

The Cruse-Kemper Company, Ambler, Pa., iron workers, is building a one-story brick boiler house. No new equipment is contemplated.

P. William Huston, Germantown and Hunting Park avenues, Philadelphia, has the contract for a factory to be built for Albert H. Beck, 4035 Old York road, at a cost of $12,000.

Lucas Brothers, Inc., 221 East Baltimore street, Baltimore, Md., printers from cerotypes, has purchased an irregular lot fronting on four streets and plan to build a five-story printing and bookbinding shop.

New England

BOSTON, MASS., April 14, 1914.

The slacking up of business has been emphasized by the fact that in a great many cases manufacturers and dealers have adopted a policy of strictly hand-to-mouth buying. Some striking exceptions to prevailing conditions of reduced business exist, but as a whole trade in New England is depressed. Many men are out of work and the employment offices have few places to offer them, but the number of unemployed is exaggerated by certain journals. The conventions at Worcester next week—the National Metal Trades and the National Machine Tool Builders—will bring together a wide variety of interests in the metal industry, and the individual reports of members may illuminate the situation.

The additions which will be built by the Putnam Machine Company, Fitchburg, Mass., this season will add greatly to the capacity of the plant. Plans have just been completed which call for a machine shop building, 220 x 300 ft., one story; a foundry, 120 x 200 ft., one story; pattern shop, 50 x 100 ft., four stories, and an office building, 50 x 100 ft., one story. The equipment will be modern in every respect.

The factory of the Noiseless Typewriter Company, Middletown, Conn., was sold at auction April 8 to Joseph Merriam of that city, who will be president of a new corporation which will reorganize the business. John A. Ruffin, formerly superintendent of the business, will be the general manager.

The port directors of Boston have completed plans for the construction of a pier on the old Eastern Railroad property at East Boston at a cost of about $1,000,000. The structure will be about 1,000 ft. long and 175 ft. wide. A concrete floor will be supported by creosoted piling, and on it will be erected a shed 160 x 970 ft., with a steel frame covered with galvanized iron.

The Eastman Spring Company will erect a factory at Roberts, in Waltham, Mass.

Hemming Bros., New Haven, Conn., will add to their machine shops a building for factory purposes to cost $5000.

The new building of the Rutland Foundry & Machine Company, Rutland, Vt., will be 40 x 100 ft., and will be used for a machine shop.

An unverified report states that the Boston & Maine Railroad contemplates the building of cars and locomotives for its own use at the new shops at East Billerica, Mass. A large number of the mechanics employed at the company's repair shops at Fitchburg, Mass., have been ordered to report for duty at East Billerica.

The Merrow Machine Company, Hartford, Conn., manufacturer of textile machinery, will erect an addition to its works, containing about 6000 sq. ft. of floor space.

Bids have been submitted for an addition to the plant of the Electric Cable Company, Bridgeport, Conn., to cost $25,000.

Additions to general manufacturing plants in New England include the Claremont Paper Company, Claremont, N. H., which will double the works; a two-story brick building, 50 x 130 ft., for the White & Corbin division of the United States Envelope Company, Rockville, Conn.; Stamford Gas & Electric Company, Stamford, Conn., gas holder with capacity of 200,000 cu. ft.; C. S. Marshall Company, Brockton, Mass., addition to shoe shops, 40 x 100 ft., four stories; T. F. Boyle & Co., Woburn, Mass., granite manufacturing plant at Milford, Mass.; Meadowcroft Chemical Company, addition to works at Saybrook, Conn.

The Turner Construction Company, New York City, has been awarded the general contract for the construction of a new reinforced concrete factory building by the H. P. & E. Day Company, at Seymour, Conn. The

main portion of the structure will be 30 x 100 ft., five stories, and there will be a one-story extension, 24 x 60 ft. Work will be undertaken at once.

The town of Nantucket, Mass., has voted to construct a sewerage disposal plant, etc. A. E. Smith is secretary of the commission.

The city of Providence, R. I., will sell $325,000 worth of sewer bonds.

Chicago

CHICAGO, ILL., April 13, 1914.

It is very difficult to discover signs of improvement in the machinery trade. Industrial requirements include some buying for enlarged shop capacities, but this expansion is also below normal for the early months of the year. Inquiry from the railroads is somewhat heavier, but the competition for this business has been ruinous to prices. The Chicago & Western Indiana closed last week for the machines for which it inquired some time ago, buying an aggregate of about $40,000 in shop equipment. The list of the Pennsylvania Lines West has been revised and a few more tools have been added.

The International Roofing Mfg. Company, Chicago, Henry Hogans, president, has secured eight acres on the southwest side of the city, on which buildings will be erected at once. The transaction was handled by Hodge & Chandler, 38 South Dearborn street.

S. A. Maxwell & Co., Chicago, wall paper manufacturers, have had plans prepared for the erection of a five-story factory and warehouse, 100 x 310 ft., at West Thirty-seventh and Iron streets, the cost of which will approximate $200,000.

The Southern Cotton Oil Company, 1464 North Thirty-seventh street, Chicago, has taken out a permit for the erection of a one-story brick cooper shop, 50 x 130 ft., to cost $12,000.

The E. R. Moore Company, 4016 Broadway, Chicago, is to build a two-story brick factory, 60 x 98 ft., for which an expenditure of $16,000 is contemplated.

The Weishaupt Iron & Wire Works, 1232 South Western avenue, Chicago, is building an addition to its shop to afford increased facilities for architectural wire and light grill work.

The Charles H. Milles Foundry Company, 2443 West Twenty-first place, Chicago, suffered a fire loss of $20,000. The greatest damage was in the destruction of patterns.

The Sandow Truck Company, 3751 Wentworth avenue, Chicago, has filed notice of an increase in its capital stock from $5000 to $200,000.

The American Wrench & Bolt Machine Company, Springfield, Ill., is investigating available sites at East Springfield for the erection of a factory. The company has a liberal capitalization, but the intention is to build a plant of moderate size.

The McGuire-Cummings Car Company, Paris, Ill., is preparing to enlarge its manufacturing facilities at once. The present equipment, particularly in the steel car department, is inadequate.

The Kise Electric Company, Peoria, Ill., has been incorporated with a capital of $50,000 to manufacture a gasoline-electric power unit. The company proposes to build a factory at an early date.

The Condon Concrete Post Company, Dixon, Ill., has been organized with a capital of $3000 and will manufacture concrete post molding machines. The incorporators are E. J. Condon, H. W. Garnett and J. W. Gelly.

The Decatur Mfg. Company, Decatur, Ill., manufacturer of fencing, is about to erect a factory in that city at a cost of $17,000. The building will be 107 x 224 ft., three stories.

Spengler Brothers, Rockford, Ill., manufacturers of specialties, are contemplating the erection of a factory, 50 x 150 ft.

The L. P. Halladay Company, Streator, Ill., has had plans prepared for a brick factory building, 43 x 115 ft., to be added to the company's present works.

The Sanitary Stove Mfg. Company, Benton, Ill., has increased its capital from $175,000 to $300,000 for the purpose of increasing its facilities.

The plant of the Illinois Automobile Company, Galesburg, Ill., was burned April 9 with a loss of $25,000. It will be re-equipped.

The Watters Hinge Company, Galesburg, Ill., has been incorporated with a capital of $2400 to manufacture hinges and builders' hardware. The company was organized by I. H. Watters.

The Danville Refractories Company, Danville, Ill., incorporated with a capital of $300,000, is making plans for the erection of a large plant in that city.

J. M. Fleming, Peoria, Ill., is making plans that will lead to the building of an addition to the machine shop he is now operating.

It is reported that the Illinois Central Railroad is preparing to make extensive improvements at its shops at Clinton, Ill.

The town of Kewanee, Ill., will purchase pumping machinery.

The Iowa Gate Company, Cedar Falls, Iowa, is preparing to build a one-story factory, 100 x 600 ft., to cost $50,000. It is expected that the new plant will be completed in the current year.

The Armstrong Company, Waterloo, Iowa, has awarded the contract for its new plant, which will be of steel and fireproof construction. The estimated cost is $75,000.

The town of Coin, Iowa, has voted $12,000 for construction of the municipal water plant.

J. W. Skinner, mayor, Hammond, Iowa, will receive bids until April 27 for two 750-gal. per min. pumps.

The town of Manila, Iowa, has voted $20,000 in bonds for a municipal lighting plant.

The town of Comfrey, Minn., has voted $8000 of bonds for electric light plant.

The Farmington Electric Light & Power Company, Farmington, Minn., plans to erect a power plant and instal a 50-kw., 60-cycle, 2300-volt generator, with engines, boilers and auxiliary equipment. F. H. Eddy is manager.

The Granite City Iron Works, St. Cloud, Minn., formerly owned by James Colgrove, has been purchased by A. D. Allen.

The King Ventilating Company, Owatonna, Minn., reports its factory nearly ready for occupancy. The company makes a specialty of a barn aerator.

The Kienzle & Merrick Mfg. Co., Minneapolis, Minn., ornamental iron and bronze worker, has awarded the contract for the addition to its factory, 45 x 66 ft., three stories, and for a one-story blacksmith shop, 23 x 27 ft.

The Crown Iron Works, Minneapolis, Minn., is building an addition to its plant, 36 x 50 ft. and 35 x 48 ft., two stories, brick construction, to be used for office and pattern shop, etc., at an estimated cost of $14,000.

The Ft. Dodge Mfg. Company, Ft. Dodge, Iowa, manufacturer of interior finish and office fixtures, suffered a fire loss at its plant estimated at $20,000.

Leonard Peterson & Co., 1240 Fullerton avenue, Chicago, woodworkers, will build a one and two-story factory, 50 x 147 ft., to cost $25,000.

The Marine Light & Ice Company, Marine, Ill., has been incorporated with a capital stock of $20,000 by Fred Scheurer and others.

Milwaukee

MILWAUKEE, WIS., April 13, 1914.

Machine-tool makers report a slight gain in bookings, and there is improvement in the electrical power equipment line. Pay-rolls are gradually being increased, but employers are having no difficulty in getting skilled labor. The demand for special machinery is a feature of the situation. Heavy machinery continues dull. Favorable weather is hastening building projects and some good business is expected to develop shortly.

The Carbolineum Wood Preserving Company, 518 Prairie street, Milwaukee, will build a three-story addi-

tion, 50 x 150 ft., equipped for chemical and treating apparatus manufacture. Alfred C. Clas is architect.

The Federal Machine Company, capital stock $25,000, has been organized by W. H. Heidemann, 429 Grand avenue, Milwaukee, and L. A. Baerman, to manufacture and deal in machinery. Definite plans will not be divulged for the present.

The Wisconsin Machinery Company, West Allis, Wis., is erecting a plant which will include a machine shop and foundry. The plant is located south of Burnham street, near Fifty-third avenue.

The Kissel Motor Car Company, Hartford, Wis., has completed an addition to its plant which increases the floor space by 60,000 sq. ft. The new building will provide for the departments that were temporarily located in the plant of the Romadka Trunk Works, at Milwaukee, which has been sold to the Westinghouse Lamp Company.

C. W. Cole, engineer, Mishawaka, Wis., will receive bids until April 21, for constructing a sewer system for Chesterton, Ind.

The Otto Biefeld Company, Watertown, Wis., boiler and general machinery manufacturer, is having plans prepared by Alfred C. Clas, Milwaukee, for machine shop of brick and steel, 60 x 103 ft., one story and basement. Bids will be taken about April 15.

Frank A. Starck, Madison, Wis., has organized the F. A. Starck Company, capital $6000, to engage in the manufacture of patent window locks, sash ventilators and other metal specialties. William Corscot and John Starck are associated with him.

The Killen-Strait Mfg. Company, Appleton, Wis., capital $200,000, has been incorporated for the manufacture of gasoline tractors and heavy duty hauling machinery. W. H. Killen and W. K. Strait, engineers and designers of the tractors, and the principal owners, have been manufacturing them for some months. The company is now ready to begin manufacturing on a large scale and the incorporation is to facilitate the project. It will begin the equipment of a shop at once, using the present works as a nucleus.

The Two Rivers Plating Works, Two Rivers, Wis., is adding to its works a tinning plant for hot tinning and galvanizing. Further expansion is anticipated, and the equipment is arranged to be operated by electric power, generated by the company's plant.

The Racine Mfg. Company, Racine, Wis., is building an addition to its factory, 100 x 280 ft., four stories, of brick construction, for the manufacture of closed automobile bodies. The equipment has been purchased.

The Lewis-Petard-Cram Motor Company, Racine, Wis., has awarded the contract for structural improvements to its plant. It is buying new tools and equipment from time to time as needed.

Joseph Wodsedalek, Algoma, Wis., manufacturer of ensilage cutters and other farm machinery, is installing two new brass and crucible furnaces and is purchasing other equipment to enable him to increase his production.

The Sturtevant, Wright & Wagner Dairy Company, Beloit, Wis., will expend approximately $20,000 in the installation of boilers and special dairy equipment for pasteurizing and condensing milk.

The August F. Westphal Company, Hartford, Wis., has purchased the plant of the Northwestern Cold Storage Company, Fond du Lac, Wis., and will increase the size and equipment after May 1.

Indianapolis

INDIANAPOLIS, IND., April 13, 1914.

The Unique Mfg. Company, Indianapolis, has been incorporated with $5000 capital stock, to manufacture woodworking machinery. The directors are G. G. Westerfield, U. H. Rothschild and B. Rothschild.

The Great Western Rubber works, Richmond, Ind., has been incorporated with $50,000 capital stock, to manufacture rubber goods. The directors are E. P. Denison, G. D. Doremus and J. C. Burdett.

The Mid-West Paper Company, Anderson, Ind., recently organized by W. H. Fairchild and Berg Heinrich, has contracted with the chamber of commerce of Anderson to have a factory in operation in that city by July 1.

The O. F. Jordan Company, East Chicago, Ind., has been incorporated with $150,000 capital stock, to manufacture machinery. The directors are J. H. Cummins, Jr., C. Y. Freeman and F. H. Wickett, all of Chicago.

The Ansted Spring & Axle Company, Connersville, Ind., is building an addition to its plant to be used exclusively for the manufacture of springs.

The H. Paul Prigg Company, Anderson, Ind., has been incorporated with $100,000 capital stock to manufacture cyclecars. The directors are H. Paul Prigg, S. M. Prigg and F. S. Sheets.

The Anderson Wire & Steel Company, Anderson, Ind., has moved to Evansville, Ind., and has changed its name to the Shimer Wire & Steel Company.

The city of Huntington, Ind., has been authorized to enlarge its municipal lighting plant.

The town of Cannelton, Ind., is receiving bids for a pump of 350 gal. per min. capacity, either centrifugal or turbine type. F. Berger is city clerk.

Cleveland

CLEVELAND, OHIO, April 13, 1914.

Business in machine tool lines is again dull, although an improvement is noted in spots. For a few weeks there was a fair volume of business in single tool orders, but this demand has subsided somewhat. Dealers feel, however, that the outlook is better than a few weeks ago, for the reason that more business is in prospect, but very little of this is now being figured on. The only new inquiry of any size is one for toolroom and die-making equipment amounting to about a dozen small tools. A local maker of drilling machines reports considerable improvement in orders both from the automobile and other trades. The demand for cranes and other handling equipment continues light. The demand in foundry lines shows no improvement and most jobbing foundries are running at 50 per cent. or less of their capacity.

The first contract in connection with the new filtration plant in Cleveland will be placed shortly. Bids for the construction of the concrete mixing chambers, coagulation basins, filters and main piping outside of the filters will be received by the commissioner of purchases and supplies April 21. On April 24 bids will be received for complete laundry equipment for the city hospital group. Proposals for a cold storage refrigerating system for the West Side market house were received April 15.

The William Bingham Company, Cleveland, wholesale and retail hardware dealer, is having plans prepared for a large warehouse and store room for which a site was acquired on West Ninth street a year ago. The building will probably be a 10-story structure. Elevators of large capacity will be installed and considerable machinery equipment will probably be required.

The National Machinery & Wrecking Company, Cleveland, has purchased considerable electrical equipment from the Cleveland Railway Company, all the equipment of the Willoughby power plant of the Cleveland, Painesville & Eastern Railway and seven direct-connected units from the Toledo Railway & Light Company.

The Cuyahoga Spring Company, Cleveland, which recently increased its capitalization, will install some additional equipment, including tempering equipment and spring coiling and wire forming machinery.

The Globe Pattern Company, Cleveland, has been incorporated with a capitalization of $5000 to make metal patterns. The company will succeed the Globe Pattern Works now located at 1250 West Seventy-sixth street. It plans a little later to secure larger quarters and add some new machinery.

The city engineer, Toledo, Ohio, will prepare preliminary plans for a high-pressure pumping station.

The Berger Mfg. Company, Canton, Ohio, has had plans prepared for additions that include an enameling

plant and emergency hospital. Construction work, however, will be deferred until business conditions improve.

The Ohio Road Machinery Company, Oberlin, Ohio, will purchase some new machinery equipment for an extension to its plant which will be built shortly.

The Central South

LOUISVILLE, KY., April 13, 1914.

The machinery market is not marked by any great amount of activity. In some branches it is nearly up to normal, but general lines are slow. Boilers are reported as moving in only about half the usual volume. Machine tools, on the other hand, are finding a fair market. Electrical equipment, except in the smaller items, is not in strong demand. The West and the Northeast are buying a little more heavily than other sections from local manufacturers, the situation in the South being quiet.

The Nugent Sand Company, Louisville, Ky., is in the market for conveying equipment for a 300-cu. yd. hopper. W. F. Nugent is president.

The Bradley & Gilbert Company, Louisville, will place orders in the next two months for additional paper box making equipment. Address George F. Coder, vice-president. Electric motors will also be needed.

The Edward L. Davis Lumber Company, Louisville, has purchased a large band-mill at Lottie, La. All supplies for it will be bought through the Louisville office.

The Kentucky Corrugated Paper Company, Louisville, will buy corrugating equipment. Motors also will be purchased. F. S. Bishop is manager.

The Union Safety Powder Company, Starks Building, Louisville, is in the market for equipment for a plant for the manufacture of explosives. Special equipment and an 80-hp. boiler will be purchased. C. W. Shaffer is president.

The Gambrinus Cooperage Company, Louisville, is purchasing equipment for its tight cooperage plant, to replace the one destroyed by fire.

The city commissioners, Covington, Ky., will purchase some equipment for the water plant.

The Victoria Coal Company, Maysville, Ky., is purchasing coal mining machinery for a new shaft.

L. M. Buford, and others, of Roanoke, Va., will start operations near Hazard, Ky., shortly. They will open mines on 3200 acres and have organized a company with a capitalization of $150,000.

The Premier Products Company, recently organized by Arthur Cobb, and others, Bowling Green, Ky., will purchase equipment for coal and iron operations near Edmonton, Ky. The company is capitalized at $300,000.

The Culver Ice Cream Company, Fulton, Ky., is purchasing new equipment to cost about $4000.

The Lebanon Steam Laundry, Lebanon, Ky., will add a dry cleaning plant to cost about $10,000. Equipment is now being purchased.

The Mayfield Woolen Mills, Mayfield, Ky., is preparing to double the capacity of its plant at Paducah, Ky. H. J. Wright, of the Mayfield office, is in charge of plans.

The Fulton Electric Light & Power Company, Fulton, Ky., is planning improvements in its plant.

An electric lighting plant is to be installed at Cadiz, Ky., by George L. Smith, and others.

The Advance Oil Company, Scottsville, Ky., is being organized for oil land development. W. Mayfield, who is to be general manager, will purchase equipment.

E. W. Avey, Columbia, Ky., has information concerning a proposed cotton gin and broom factory.

The plant of the Hodgenville Lighting Company, Hodgenville, Ky., has been sold to E. L. Herren, Liberty, Ky., who is planning to improve and enlarge it and add an ice factory.

The Martindale Oil Company, Scottsville, Ky., is in the market for engines and other oil-well equipment.

The Lexington Granite Company, Lexington, Ky., of which H. D. Cloud is president, will erect a new plant and will purchase additional stone-cutting machinery.

The Scottsville Electric Light Company, Scottsville, Ky., has been organized by H. L. Hendrick, and others, and will install a small plant.

The Clearfield Heading Company, Clearfield, Ky., which was recently organized by G. H. Gearheart and others with $10,000 capital stock, wants cooperage machinery.

The Appalachian Mills, a knitting company, will add one story to its Holston mills at Knoxville, Tenn., and will install additional equipment.

L. D. Tyson, and others, of Knoxville, Tenn., have organized the Southern Locomotive Valve Gear Company, with capitalization of $300,000, and will purchase metal-working equipment.

The mills of the Russe & Burgess Hardwood Lumber Company, Memphis, Tenn,, were destroyed by fire with $50,000 loss. A new plant will be built and equipped as soon as possible.

The city of Louisville will purchase new boilers in a few months to replace those in use at the Home for the Aged and Infirm.

The Kelsey Wheel Company, Memphis, Tenn., will build an addition to its plant which will cost $50,000. Equipment is being purchased.

The Nashville Creamery Company, Robert Jackson, president, will install equipment to increase its capacity from 1000 lb. to 5000 lb. daily.

The Converse Bridge Company, Chattanooga, Tenn., has been reorganized and will undertake work on five new contracts. D. H. Wood is president.

Patterson, Kirk & Co., Nashville, Tenn., have taken over the plant of the Hermitage Tobacco Works and will enlarge it shortly. W. K. Patterson is president.

Detroit

DETROIT, MICH., April 13, 1914.

The machinery market appears to show some improvement and quite a number of local machine tool dealers and builders report a fairly satisfactory business. An increased volume of inquiry is before the trade, but individual inquiries are for small requirements and there is nothing to indicate any marked increase in industrial activity. Electrical equipment is moving slowly. Local machine shops are generally finding that business is improving and the same condition obtains in the foundry trade. A large number of bond issues involving municipal improvements are before the people at the spring elections and some business is expected to result. Building circles are active, but there is a dearth of industrial construction.

The Aetna Motor Truck Company, Detroit, organized to manufacture automobile trucks, has been incorporated with $150,000 capital stock. The company is negotiating for a factory and expects to begin operations in the near future. Directors are J. G. Wagner, E. E. Kinney, J. J. Wilson and W. A. Eldred.

The plant of the E. J. Kruce Cracker Company, Detroit, has been purchased by the Lakeside Biscuit Company, Toledo, Ohio. In addition to operating the present plant the purchaser will erect a new manufacturing building, 100 x 138 ft., and six stories in hight.

The Sweet Mfg. Company, Detroit, has been incorporated with $10,000 capital stock to manufacture gas engines. George P. Sweet is the principal stockholder.

The American Air Compressor Company, Detroit, operating a machine shop and brass foundry, has filed a voluntary petition for dissolution. The Union Trust Company has been appointed receiver.

The Fibre Package Company, Detroit, has been incorporated with $100,000 capital stock to manufacture paper boxes and box board containers. The incorporators are F. C. Walker, Charles Cooley and Charles Grey.

The Thermo Electric Starter Company, Detroit, has increased its capital stock from $10,000 to $100,000.

The Rempis & Gallmeyer Company, Grand Rapids, Mich., manufacturer of iron and steel products, has

purchased a site adjacent to its present plant and purposes to erect a large brass foundry thereon.

The Saginaw Ladder Company, Saginaw, Mich., whose plant was recently destroyed by fire, has taken over the factory formerly occupied by the Saginaw Wheelbarrow Company. The plant will be remodeled in part and considerable new machinery installed.

The Wayne Belt Company, Detroit, which is to locate in Mt. Clemens, Mich., has completed negotiations for a factory site and will soon award contracts for its building. The building will have a floor space of about 10,000 sq. ft. Electric power will be utilized throughout. E. W. Sprackman is general manager.

The Metal Parts Mfg. Company, Flint, Mich., has been organized by Frank B. Sutherland, and others, to conduct a general machine shop and special tool business. The company advises that the necessary equipment has been purchased.

The village of Freeport, Mich., will install a waterworks system. A pumping station will be erected and equipment installed at once.

C. H. Bennett, Plymouth, Mich., is at the head of a new company which will establish a plant at Rochester, Mich., for the manufacture of imitation leather.

The Baker Clay Company, Grand Ledge, Mich., is being organized with $150,000 capital stock by E. H. Baker, and others. The new company proposes to establish a plant for the manufacture of clay products.

The Temple Mfg. Company, Clare, Mich., has acquired extensive timber holdings near Petoskey, Mich., and will develop them by the establishment of a novelty works and stave mill.

The Copeman Electric Stove Company, Flint, Mich., has increased its capital stock from $200,000 to $300,000.

Cincinnati

CINCINNATI, OHIO, April 13, 1914.

The smaller sizes of electric generators and motors are in good demand, and there are also a number of large contracts in sight for power plant equipment. Reports from both manufacturers and dealers in machine tools indicate that there is no improvement in the situation; on the other hand, a number state that the inquiry has fallen off. There is very little business coming in from either the railroads or automobile manufacturers, and the export trade is only moderately good. The foundries are operating to only about 50 per cent. of capacity; this estimate does not include the stove foundries, that are quite busy.

S. S. & G. H. Godley, Neave Building, Cincinnati, architects, have been commissioned by the Doepke Company, First National Bank Building, to draw plans for a power house. Power plant and electrical equipment will be required.

The Winton Motor Car Company, 324 West Seventh street, Cincinnati, expects to install a well-equipped repair shop at an early date. Nothing has been given out as to the necessary tools. F. H. Walley is manager.

F. G. Mueller, Rentchler Building, Hamilton, Ohio, architect, is one of those preparing plans for a large high school building, for which considerable heating and ventilating equipment will be required. Bids will be asked for at an early date.

Electrical and heating equipment will be required for a 13-story office building to be erected by the Central Dayton Building Company, Dayton, Ohio. The Ferro Concrete Construction Company, Cincinnati, has the contract for the construction of the building.

Work has commenced on a factory building for the Doty Mfg. Company, Dayton, Ohio, that will be 80 x 120 ft., two stories and of reinforced concrete construction. The company manufactures vacuum cleaners and other specialties. Mention of this project was made several weeks ago.

The Apple Auto Top Company, Miamisburg, Ohio, has had plans prepared for a factory building that will be two stories, 100 x 250 ft., of regular mill construction. Nothing is known as to equipment needs.

The village of Amelia, Ohio, is advertising for bids for power and electrical equipment for a public lighting plant.

It is reported, but not confirmed, that the Lagonda Mfg. Company, Springfield, Ohio, has had plans prepared for an addition to its plant that will be 65 x 125 ft., one story, of reinforced concrete construction.

The Auto Valve Company, Ironton, Ohio, has been incorporated with $10,000 capital stock by Otto Ebert, and others. A small factory will be fitted up at an early date for the manufacture of an automobile specialty.

The Brown Mfg. Company, Wilmington, Ohio, is fitting up a factory for the manufacture of automobile specialties. Practically all the necessary machine tools have been purchased.

The Leitchfield Electric Light Company, Leitchfield, Ky., is making an addition to its power plant in which will be installed an 80-hp. engine direct connected to a 50-kw. generator.

The city of Urbana, Ohio, has sold $28,000 of bonds for a sewerage disposal plant, and $6500 of bonds for a waterworks engine.

Birmingham

BIRMINGHAM, ALA., April 13, 1914.

There has been no improvement in the machinery trade. Were it not for the prosperity existing in the rural sections, the planting of large crops and good crop prospects, the dullness would be of record nature. Purchases for farm service continue in a normal way and small gasoline engines are in demand. Outside of that trade is featureless.

The Sherman-Spann Lumber Company, Dothan, Ala., has been incorporated with a capital stock of $50,000 by W. C. Sherman, Columbiana, Ala.; H. F. Spann, Bamberg, S. C., and M. S. Spann, Dothan. It has a lumber plant at Fountain, Fla., with a daily capacity of 35,000 ft.

The Superior Mfg. Company, Bessemer, Ala., will build a soil pipe foundry at a cost of $60,000. Wiley Alford is president. The plant is to be in operation by June.

The plant of the Buckeye Cotton Oil Company, Hurtsboro, Ala., is to be improved, it is reported, at a cost of $10,000.

The City Council, Gadsden, Ala., has about decided upon the construction of a municipal electric lighting plant.

The Oneonta Ice, Light & Coal Company, Oneonta, Ala., will build an electric plant costing $15,000.

The city clerk, Clinton, Ala., will receive bids until May 1 for installing a waterworks system.

The Seaboard Lumber Company, Savannah, Ga., has been incorporated with a capital stock of $1,750,000. It is a merger of a number of lumbering firms. T. F. Johnson and C. F. Reiser, of Springfield, Ga., are among the incorporators.

The Brunswick Creosoting Company, Brunswick, Ga., will establish a large tie creosoting plant. The company has a capital stock of $150,000. C. Lee Cook, Louisville, Ky., and L. R. Akin, Brunswick, Ga., are among the incorporators.

The Nye Odorless Crematory Company, Atlanta, Ga., will erect a factory at Sarnia, Ont., for the manufacture of incinerators, etc.

The Tampa Foundry & Machine Company, Tampa, Fla., is erecting a boiler shop, 60 x 150 ft., and will alter its present boiler shop into an additional machine shop. The proposed equipment is designed to enable boilers to be removed and installed directly in and out of vessels, by means of a 60-ton shear leg.

The Robinson Point Lumber Company, Pensacola, Fla., will establish a plant in place of the one recently burned. It will have a daily capacity of 25,000 ft.

The city of Batonia Beach, Fla., has voted $26,500 for waterworks improvements.

Bids will be received by the board of public works, Daytona, Fla., until May 5, for $125,000 of sewerage and drainage bonds.

An electro-chemical fertilizer plant to utilize 10,000 electrical hp. will be built, it is reported, at Mt. Holly, N. C., by interests connected with the Southern Power Company, Charlotte, N. C. Phosphate rock is to be handled.

The town of Jeffersonville, Va., has voted $17,000 for water system construction.

Texas

AUSTIN, TEX., April 11, 1914.

Agricultural interests and business generally received a severe setback this week by a frost that did much damage to corn and other crops in central and southern Texas. Much replanting will have to be done. A good demand for irrigation pumping machinery is one of the noticeable features of the machinery trade.

A bond issue of $17,500 has been voted by the town of Franklin for an electric light plant and a water works to replace those recently destroyed by fire.

J. B. Sterling, and associates, Dayton, will construct an electric light and power plant.

The Guadalupe Water Power Company has had plans prepared for its proposed hydroelectric plants to be constructed on the Guadalupe River. The initial plant will cost approximately $2,000,000 and will develop about 10,000 hp. Guy C. Simpson, San Antonio, is the engineer.

Boyd Smith, San Marcos, and associates, will construct a water works plant at Lockhart and erect an ice factory.

C. J. Adams, Calallen, will construct an irrigation pumping plant.

The Houston & Lichnovsky Gin Company, Floresville, has begun the construction of a cotton gin which will have a daily capacity of 100 bales.

It is announced by Edward T. Moore, Dallas, general manager of the properties of the Stone & Webster Engineering Corporation, Boston, Mass., that it has been definitely decided to build an interurban electric railroad between Dallas and Terrell, a distance of 30 miles.

L. D. Harter, Aransas Pass, has under consideration the construction of a factory at Bishop for the manufacture of silos.

The Planters' Oil Company, Herne, will erect a cotton seed oil mill at Taylor to cost $100,000. P. S. Grogan, Houston, is president.

The Cole Press Brick Company, Ferris, will construct a brick-making plant. It has a capital stock of $42,000. J. M. Batchler is interested.

The Alpine Light & Ice Company, Alpine, has been organized with a capital stock of $20,000. J. D. Jackson is interested.

The Rosita Irrigation Company will install a pumping plant near Eagle Pass. A. H. Evans is interested.

The city of Beaumont will take over the Beaumont Waterworks Company and will make improvements costing $100,000.

The Kelmont Electric Company, Dallas, has been organized with a nominal capital of $5000. Its purpose is to construct electric railroads and belt railroads in and near Dallas. J. A. Sanders is interested.

The Continental Gin Company, Dallas, has awarded the contract for the construction of a cotton gin and factory, to cost about $300,000.

The Alamogordo Light & Power Company, Alamogordo, N. M., has been organized with a capital stock of $25,000. W. R. Eidson is interested.

The Penn-Mex Fuel Oil Company has awarded a contract to the National Transit Company, Oil City, Pa., for the construction of three large oil-pumping stations in the Tuxpam, Mexico, district, about 70 miles south of Tampico. Each pumping engine will have a capacity of 42,000 bbl. every 24 hours. Approximately 125 carloads of machinery and equipment will be required.

St. Louis

ST. LOUIS, MO., April 13, 1914.

Conditions in the machine tool market show no measurable improvement and business remains at a relatively low ebb, particularly in the city; such improvement as has been noted coming from the country districts. The demand is varied with no particular class of equipment prominent. Large industries are still conservative, and the purchases for the most part are being made in single tools for special purposes, with some instances of replacement. It is the general impression among dealers that there will be little increase in business until the railroad rate situation is cleared up, the reserve bank developments put in positive form and the crop conditions more assured. Second-hand tools are in but light request.

The Jeffery Motor Car Company, St. Louis, has been incorporated with a capital stock of $14,000 by Albert Albrecht, T. V. Murphy and George Eigel to equip a repair shop and garage.

The Security Fastener Company, St. Louis, has been incorporated with a capital stock of $25,000 by A. D. Tibbals, John Longmire, Wayne Wheeling, G. B. Farrar and Henry T. Lindsay to manufacture wire and other sealing devices.

The Maple Mfg. Company, St. Louis, has been incorporated with a capital stock of $50,000 by L. A. Maple, William P. Rowan and George S. Elder to do a specialty manufacturing business, including machinery valves, etc.

The Manufacturers' Railway, St. Louis, George F. Moore, president, has plans for the construction and equipment of an incline, etc., for the mechanical handling of freight from river to boat, etc.

The Railway Special Accessories Company, St. Louis, has been incorporated with a capital stock of $100,000 by Henry E. Billman, Leo R. Mann and Walter C. Guels to manufacture railroad supplies.

The United States Dry Plate Cutting Machine Company, St. Louis, has been incorporated with a capital stock of $10,000 by Arnold L. Milentz, F. Ernest Cramer, Edward C. Clostermeyer to manufacture machines.

The water commissioner of the city of St. Louis will install a refrigerating plant.

Hooven & Allison Company, North Kansas City, Mo., is making rapid progress in the construction of its plant for the manufacture of rope and twine with the expectation of having it completed by August 1. An expenditure of $100,000 for plant and equipment is contemplated.

The town clerk of Holt, Mo., is negotiating for the installation of an electric plant for public service.

An electric light and power plant is to be installed at Keytesville, Mo., by Ira B. Parks, Salisbury, Mo.

A water plant will be equipped at LaGrange, Mo., by the city authorities under the supervision of C. H. Hoskins, city engineer. Machinery is now being bought.

Plans are being prepared for the installation of a $75,000 waterworks and light plant at Poplar Bluff, Mo.

The Senath Light & Power Company, Senath, Mo., recently reported incorporated by Alvin Chapman, and others, is reported in the market for the necessary equipment.

The Aunt Jemima Mills Company, St. Joseph, Mo., has been incorporated with a capital stock of $500,000 by Robert R. Clark, Graham G. Lacy and William M. Clark, and will acquire the plant of the Davis Milling Company, which will be enlarged and remodeled. Ralph Callaway, Cameron, Mo., will equip an ice plant.

James Simcox, Glasgow, Mo., and others, will install an ice plant of 10 tons' capacity.

A refrigerating plant will be equipped at Kirksville, Mo., by Bondurant Brothers.

An ice plant of 15 to 20 tons' capacity is planned for Marcelline, Mo., by J. W. McAllister, manager of the Marcelline Creamery Company.

A coal chute, mechanically operated, of the link-belt type, will be installed at Cameron, Mo., by the Chicago, Burlington & Quincy Railroad, the capacity to be 150 tons. The chief engineer at the Chicago offices should be addressed.

The Hayward Wrench Company, Springfield, Mo., recently incorporated with a capital stock of $100,000 by H. H. and Homer Hayward, is reported in the market for machinery.

The plant of the Rose City Oil Mill Company, Argenta, Ark., recently reported burned, will be replaced with a plant to cost about $125,000 by Alfred G. Kahn, F. B. T. Hollenberg and C. P. Reed, who will incorporate a new company.

An ice plant at Carlisle, Ark., will be equipped by a company of which Walter Saunders is president.

An ice plant of about 20 tons' capacity will be equipped at Everton, Ark., by J. C. Mitchell.

A plant for the manufacture of tools at a point in Arkansas to be selected will be equipped by W. B. Bayless, W. M. Turner, L. M. Thompson, and others, of Memphis, Tenn., who will incorporate for $70,000.

H. A. and H. E. Vandusen will equip a woodworking plant at Malvern, Ark. They may be addressed at Cotton Plant, Ark., in care of the Cotton Plant Veneer Company.

The Cotton Plant Handle Company, Cotton Plant, Ark., has been incorporated with a capital stock of $16,000 by R. P. Sallee, and others, and will equip a woodworking factory.

The Capital Ice & Storage Company, Oklahoma, Okla., has been incorporated with a capital stock of $110,000 by John H. Shirk, of that city, J. P. O'Leary, of New Orleans, and others, to manufacture ice.

The Hominy Ice, Light & Power Company, Hominy, Okla., has been incorporated with a capital stock of $15,000 by Harry Askin, of Cushing, Okla., and others.

The town of Flora, Miss., will build an electric light plant and enlarge the water plant. M. L. Culley, Jackson, Miss., is the engineer.

The Delta Light & Traction Company, Greenville, Miss., has been incorporated with a capital stock of $200,000 by R. B. Clagget, and others, who will enlarge and remodel a local plant.

An ice plant of about 30 tons' capacity will be installed at Oxford, Miss., by C. J. Lawhorne.

The Elk Lumber Company, Canton, Miss., L. O. Crosby, and others interested, will equip a saw and planing mill of 75,000-ft. daily capacity, and later install a hardwood lumber mill of about the same size.

The city of Clarksdale, Miss., is proceeding with the equipment of a waterworks plant, and has made A. L. Dabney, Memphis, Tenn., engineer in charge.

The city of Breaux Bridge, La., C. C. Rees, mayor, is in the market for a 700-light dynamo, direct connected to engine, marine boiler, etc.

The commissioners of the port of New Orleans, La., will receive bids until April 22 for machinery in connection with three banana conveyers of the Harris-Eddleston type, including electric motors, etc.

A plant for the manufacture of buggy bodies will be equipped at Jonesville, La., by H. M. Wheeler and J. C. Jones.

The Louisiana State Normal School, Natchitoches, La., will equip a waterworks plant of 100,000-gal. daily capacity, including electric pumping apparatus.

The city of Halls, Tenn., will add equipment to the light and water plant, including a 1000-kw. generator.

The Pacific Coast

SEATTLE, WASH., April 7, 1914.

Some anxiety is caused by failure of the market for north Pacific lumber products to revive as it should, but mills and logging camps are now quite generally in operation, and for the present are buying about the normal amount of general equipment. If the lumber trade picks up later on, as is expected, the machinery houses of this district will be assured of a good year. Just at present one of the principal features is the forwarding of mining machinery to Alaska, several large shipments having been dispatched recently. There is a good general demand for miscellaneous machinery, no particular line aside from those mentioned being of special importance at the moment.

Thousands of men will soon be given employment and millions of dollars will be expended on railroad construction work to be undertaken in Washington and British Columbia this spring. On May 1 work will be started on the 35-mile extension of the Chicago, Milwaukee & St. Paul, between South Bend and Raymond. The Northern Pacific will shortly begin on 21 miles of new line between Lester and Easton, and the Great Northern will resume work on its Wenatchee-Oroville extension. In British Columbia, the Kettle Valley branch of the Canadian Pacific to be built through a mountainous country from Pendleton to Princeton, will soon be started.

The Stump Pulling Machines Company, Seattle, Wash., has been incorporated by J. O. Preston, and others, to manufacture hand and power stump-pulling machines. The devices are being manufactured for the present under contract, and no plans for the erection of a factory have been formulated.

The Salmon River Power & Light Company, Spokane, Wash., with a capitalization of $400,000, has recently been organized by H. H. Boomer, of Boomer & Hughes, railroad contractors, Spokane, and C. L. McKenzie, and others, of Colfax, Wash. It expects to develop several large electric light and power projects in Idaho, and is having plans prepared for the work.

Plans for the installation of a belt manufacturing plant have been prepared for C. Perkins by H. B. Pederson, 4758 Ballard avenue, Seattle.

The Self-Oiling & Bearing Company, Walla Walla, Wash., has purchased a site for a factory. It will receive bids in the near future for construction of a machine shop and foundry. The estimated cost of the plant is $25,000.

The Stevens County Light & Power Company, Colville, Wash., is planning extensive improvements, including the installation of some machinery.

The Buckley Electrical Company, Buckley, Wash., has been purchased by the Puget Sound Traction, Light & Power Company, Seattle. It will make improvements to the plant.

The Canadian Pacific Railroad has called for bids for the installation of refrigerating machinery in two of its steamers.

The Consumers' Mfg. & Supply Company, Tacoma, recently incorporated by D. M. Morgan, L. D. Stone, etc., has leased a building in that city with the intention of installing a flour and feed mill, with a daily capacity of 275 bbl.

The Broderick & Bascom Rope Company, Seattle, will construct an addition to its factory. Stephen & Stephen, architects, New York Block, will receive bids.

Barton & Co., Seattle, distributors for Burns & Co., Canadian meat packers, contemplate the construction of a cold storage plant.

The city engineer, Spokane, Wash., has plans for the installation of a sewer system to cost $165,000.

The Eugene Excelsior Company, Eugene, Ore., contemplates extensions to its factory, which will double the capacity.

The Portland Stove Works, 626 Hood street, Portland, Ore., has purchased a site for a factory at Blythswood.

The Boeker Basket Factory, Hillsboro, Ore., announces that it will enlarge the output of its factory and add several new lines. Some machinery will be required.

The American Automatic Damper Company, Portland, Ore., is contemplating building a factory at Edmonton, Alta.

The Everfresh Food Products Company, Sutherlin, Ore., will enlarge its present plant to double capacity. Work will begin in the near future, and will include the installation of considerable new machinery.

The town of Milton, Ore., has voted $18,000 for a waterworks extension and for the development of an electric power system.

The American Brake Shoe & Foundry Company, 30 Church street, New York, has secured a site adjoining that of the Griffin Wheel Company, near Los Angeles, Cal., on which it is expected that a plant will be erected.

The Pioneer Box Company, Sisson, Cal., has leased a box factory at Anderson, Cal., and will put in machinery.

The city of South Pasadena, Cal., is advertising for bids for the construction of a sewer system at an estimated cost of $200,000.

The Quincy Lumber Company, Quincy, Cal., is building a box factory, and will install a 100-hp. steam engine, a 54-in. band resaw, a 30-in. double surfacer, a gang rip saw, a 15-in. planer and matcher, molding machines, cut-off saws, etc.

The Rogue River Public Service Corporation, Grant's Pass., Ore., has applied for permit to install a power plant at Hells Gate, on the Rogue River, which will be the second largest in Oregon. The project includes the construction of a 200-ft. dam, and the plant will develop 41,320 hp.

The city of Roundup, Mont., will improve the city water works.

Eastern Canada

TORONTO, ONT., April 11, 1914.

The Algoma Steel Corporation, Sault Ste. Marie, Ont., will call for tenders about May 1 for the building of open-hearth furnaces to be located at Steelton, Ont., and to cost about $250,000. The specifications include electric lighting, temperature regulators, freight elevator, coal-conveying and hoisting machinery, boilers, blowers, pumps, air compressors, gas engines, motors, cranes, etc.

The Eastern Steel Company, Ltd., Halifax, N. S., has been incorporated by James A. Stairs, Halifax, and others, with a capital stock of $1,000,000. It has purchased the plants and good will of the Brown Machine Company, Ltd., and the Bailey-Underwood Company, Ltd., both of Trenton, N. S., and will continue the manufacture of coal-handling machinery, agricultural implements and kindred lines made by these companies. It is stated that plans are in progress for additions to the plants and equipment.

The Polson Iron Works, Toronto, is in the market for a double-ended punch, a 5-ton locomotive crane and a number of light pneumatic tools.

The Welland Lumber Company, Ltd., Welland, Ont., will erect a sash and door factory at Welland, Ont.

The United Universal Chemical & Electrical Company, Waterford, Ont., will erect a factory for the manufacture of electrical fixtures, telephones, etc.

The Gerhard Heintzman Piano Company, Toronto, Ont., is contemplating the erection of a factory at Vancouver, B. C.

The Central Ice & Cold Storage Company, Ltd., Toronto, will build a five-story plant with a capacity of 500,000 cu. ft., to cost about $150,000.

The Northumberland Paper & Electric Company, Ltd., Campbellford, Ont., will improve and enlarge its box-board mill.

The Niagara Silk Mills Company, Buffalo, N. Y., will erect a three-story silk mill at Niagara Falls, Ont.

The Central Canada Coal Company, Brockville, Ont., will erect a coal elevator to cost $20,000.

The Lindus Company, Ltd., Brampton, Ont., will erect a plant to cost about $50,000.

John and Charles Dick will erect a plant at Chatham, Ont., in the near future to manufacture felt, etc.

The Neidner Company, Malden, Mass., will erect a factory at Coaticook, Que., for the manufacture of hose, etc.

The Dominion Motor Car Company, recently organized at Coldbrook, N. B., will erect an automobile factory.

The Imperial Steel & Wire Company, Collingwood, Ont., will erect a wood-screw factory.

The O. B. Shoe Company, Ltd., Drummondville, Que., whose factory was destroyed by fire, will erect a plant to cost $120,000.

The Standard Chemical, Iron & Lumber Company, Eganville, Ont., will erect a saw mill.

The Mueller Mfg. Company, Sarnia, Ont., has increased its capital stock from $300,000 to $500,000. It will add to its factory.

The Cole-Berger Company, Lindsay, Ont., will erect a factory and spend $12,800 for machinery.

Silverwood's, Ltd., Bathurst street, London, Ont., will build a cold-storage plant in the near future. The plant is to be operated by 500-volt, three-phase motors.

An agricultural implement factory will be located on the site recently purchased by the William Galloway Company, Sandwich, Ont.

The Montreal Boxboard Company, Montreal, has been organized by O. A. Porritt and J. R. Walker. It is remodeling the old buildings of the Montreal Woolen Company on the Lachine Canal in Montreal and will manufacture chip board from waste paper, pulp board, patent coated board, etc.

The Canadian Turbine Company, Ltd., Toronto, has been incorporated with a capital stock of $50,000 by P. H. F. Spies, William North, Edwin Watt, and others.

The Luxfer Prism Company, Ltd., Toronto, has been incorporated with a capital stock of $90,000 by William Cowan, H. B. Nicol, T. W. Horn, and others.

James Devonshire, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by W. L. L. Gordon, J. S. Duggan, R. H. Green, and others, to manufacture mechanical and electrical apparatus.

The C. J. Dryden Company, Ltd., Westmount, Que., has been incorporated with a capital stock of $25,000 by C. J. Dryden, N. C. Brown, and others, to manufacture machinery, etc.

At a meeting of the water commissioners, Brantford, Ont., it was decided to call for tenders for electric pumps and extensions to the pumping house.

The Flax Towels, Ltd., Gravenhurst, Ont., has been incorporated with a capital stock of $100,000 by T. H. Wilson, W. R. Bird, W. H. Ford, and others, to manufacture linen, wool, etc.

The Canadian-Mersereau Company, Ltd., Toronto, has been incorporated with a capital stock of $25,000 by F. L. Groff, John Abel, Charles Bolte, and others, to manufacture brass and other metal beds, springs, etc.

Western Canada

WINNIPEG, MAN., April 10, 1914.

Business in machinery is gradually increasing in volume, and the outlook for the spring and summer trade is considered satisfactory. Reports indicate that advantage will be taken of the easier money situation to carry out projects that have been held in abeyance for some time on account of the stringent financial conditions during the last six months. Many cities and towns are arranging for capital with which to make various municipal improvements, and from this standpoint 1914 is expected to be much more favorable than 1913.

The town of Wilkie, Sask., has been authorized to spend $5000 for extensions to its electric lighting plant.

The McLaren Lumber Company, Blairmore, Alta., contemplates the erection of a sawmill, at a cost of $200,000. Machinery, boilers, etc., will be required.

Plans are in progress for a large cold-storage plant for the Southern Alberta Cold Storage Company, Ltd., Lethbridge, Alta., to cost $60,000.

The Acton & Montgomery Company, Weyburn, Sask., is in the market for an oxy-acetylene welding machine.

The Interior Grain Elevator Company, Ltd., Saskatoon, Sask., will erect several elevators.

The Cascade Laundry Company, Vancouver, B. C., has been given permit for the construction of a three-story modern laundry at Beach and Thurlow streets costing $40,000.

The Medicine Hat Pure Ice Company, Medicine Hat, Alta., will build a large ice making plant.

E. Block, Shanghai, China, export merchant, at present in Vancouver, B. C., is contemplating the erection of a cold storage plant at Vancouver to cost about $250,000.

The Nanaimo Beveling & Mirror Company, Nanaimo, B. C., will erect a plant.

The Coquitlam Ice Company, Port Coquitlam, B. C., will enlarge its ice plant.

The British Sugar Refinery Company, Vancouver, B. C., will erect a two-story factory.

The James M. Davidson Fisheries, Edinburgh, Scotland, will erect a fertilizer plant on the Skeena River, in British Columbia, to cost $1,000,000.

Government Purchases

WASHINGTON, D. C., April 13, 1914.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until May 5, schedule 6641, for one portable, oil-burning, heat-treating furnace and two pipe-threading and cutting-off machines for Norfolk; until May 12, schedule 6633, for two 20-hp. vertical fire-tube boilers for Mare Island; schedule 6634, for four hoists, three 2000 lb. and one 4000 lb. capacity, for Puget Sound; schedule 6635, for miscellaneous air compressor, etc., for Mare Island; until May 19, schedule 6637, for miscellaneous refrigerating apparatus for Mare Island; schedule 6638, for one motor-driven engine lathe, one motor-driven double emery grinder, one motor-driven upright drill press and one motor-driven column shaper for Mare Island.

Bids will be received by the Paymaster-General, Navy Department, Washington, until April 21, schedule 6573, yards and docks, class 117, for four electrically driven exhaust fan outfits, for Brooklyn; schedule 6577, ordnance, class 133, for 12 trolley hoists for Newport; schedule 6585, steam engineering, class 181, for twelve chain hoists for Portsmouth; schedule 6591, construction and repair, class 208, for nine worm-gear and 29 direct differential blocks for Brooklyn; until May 5, schedule 6562, construction and repair, class 1, for two automatic steam towing machines for Mare Island; schedule 6563, steam engineering, class 11, for pumps for Mare Island; schedule 6564, steam engineering, class 12, for two turbo-generator sets, with spare parts, for Mare Island.

The purchasing officer of the Panama Canal will open bids April 24, circular 839, class 1, for 10 refrigerating machines, and in the near future will call for bids on 16 motors, direct connected to centrifugal pumps.

Bids will be received by the commissioner of light houses, Bureau of Light Houses, Washington, until April 20, for pumping and other equipment for the light house tender Laurel.

Bids will be received by Lieut.-Col. J. E. Kuhn, U. S. Engineers' Depot, Washington, until May 7, for two motor generator sets, generators of 10 kw., 115-volt, direct-connected, with starting and resistance devices.

Bids will be received by the purchasing agent, District Government, Washington, until April 30, for 10 motors, three pumps, three lift pumps, one gas engine, one electro-magnetic engine, etc.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, on April 7, for furnishing supplies for the navy yards as follows:

Schedule 6521, Steam Engineering.

Class 37, Mare Island—One turbine-driven forced-draft blower, with spare parts—Bid 97, $701.20; 176, $880.50; 169, units.

Alternate bid—Same f.o.b. works—Bid 169, units; 176, $860.50.

Schedule 6531, Ordnance.

Class 71, Washington—One 75-in. boring and turning lathe Bid 126, $34,965.

Class 72, Washington—Two extra-pattern high-duty lathes—Bid 9, $2994.55; 59, $3552; 87, $3424 and $3335; 96, $3259, $3163, $3115, $3059, $2960, $2969, $3870, $3205, $2873, $2798, $2628, and $2553; 125, $2920 and $2765.

Schedule 6539, Ordnance.

Class 123, Washington—Taps and dies—Bid 30, $498.50; 58, $1190.70; 65, $429.69, part; 75, $1115.36; 95, $1100.90; 107, $1105.75; 111, $529.66; 156, $515.82, part; 160, $755.87; 185, $681.74, part; 206, units, part; 207, informal; 220, $1298.98; 227, units, part.

The names of the bidders and the number under which they are designated in the above list are as follows:

9. Aumen Machinery Company.
30. Bigelow & Dowse Company.
58. Fairbanks Company, Baltimore.
59. Frevert Machinery Company.
65. R. W. Geldart.
75. Harmony Supply Company.
87. J. H. Johnson, Jr., & Co.
95. Knickerbocker Supply Company.
96. Kemp Machinery Company.
97. Kerr Turbine Company.
107. Manhattan Supply Company.
111. Manufacturers' Agency & Sales Company.
125. Niles-Bement-Pond Company.
126. Norristown Magnesia & Asbestos Company.
156. Frank T. Simmons.
160. R. B. Sherman.
169. B. F. Sturtevant Company.
176. Terry Steam Turbine Company.
185. Ward & Co.
206. Wells Brothers Company.
207. Wiley & Russell Mfg. Company.
220. Collieries Supply & Equipment Company.
227. James D. Rawles Company.

The following bids were received by the Chief of the Bureau of Yards and Docks, Navy Department, Washington, April 4, for two 200-kw. motor generator sets for Philadelphia.

Item one, two motor generator sets, complete; item two, same in accordance with bidder's specifications.

The Westinghouse Electric & Mfg. Company, Washington, item one, $16,621; alternate bid, $9999.99.

The Ridgway Dynamo & Engine Company, Washington, item one, $7554.

The Crocker-Wheeler Company, Ampere, N. J., item two, $9907.

The General Electric Company, Schenectady, item one, $7560.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

RISK IN WORKING AT EMERY WHEEL.—The fact that an employee engaged in grinding on an emery wheel continued work a few seconds after he saw the wheel was wabbling does not establish an assumption of the risk of being injured through breaking of the wheel, on the theory that he appreciated the danger. (Massachusetts Supreme Judicial Court, Healy vs. Perkins Machine Company, 102 Northeastern Reporter 944.)

EFFECT OF FACTORY ACT REQUIREMENT.—The provision of the Indiana factory act, requiring belting, shafting, machinery, etc., to be safe-guarded is designed to protect workmen against injury resulting from the breaking of machinery as well as against accidents resulting from employees' own negligence. Hence, an employer is liable for an injury resulting from failure to provide a practicable guard for belting, although the direct cause of the injury was breaking of a belt. (Indiana Supreme Court, Inland Steel Company vs. Ilko, 103 Northeastern Reporter 7.)

ASSUMPTION OF RISK BY MACHINE OPERATOR.—An operator who had worked at a power press for only a day and a half did not, as a matter of law, assume the risk of being injured through premature fall of the plunger, due to a defect in a clutch; inspection and repair of the machine being no part of his duty. (New Jersey Court of Errors and Appeals, Herrera vs. Manhattan Electric Supply Company, 88 Atlantic Reporter 1082.)

INJURY CAUSED BY BACKLASHING OF CABLE.—An employee injured through backlashing of a cable, used in drawing cars up an incline, can recover against the employer, if the latter failed to use a reasonable degree of care to so conduct the business as not to subject the employee to unnecessary danger. (New York Supreme Court, Appellate Division, Fourth Department, Nowak vs. Delaney Forge & Iron Company, 144 New York Supplement 232.)

TIME FOR RETURN OF MACHINE BY BUYER.—A machine was delivered to a prospective buyer on condition that, if he should return it "at the expiration" of five months after its shipment, the seller would return a deposit made by the buyer. Held, that the buyer was entitled to return of the deposit on returning the machine within a reasonable time after expiration of the five months' trial period. (New York Supreme Court, Appellate Term, De Pass vs. Stoddard, 144 New York Supplement 410.) A purchaser of a pump cannot defeat liability for the purchase price on the ground that the shaft of the pump was out of alignment, after having used it for two months without complaint on that ground. (New York Supreme Court, Appellate Division, First Department, Jonap vs. Siebert, 144 New York Supplement 7.)

SUBSTITUTION OF PARTS PATENTABLE.—If lessening the weight of a part of a machine converts it from a practical failure into a success, the change constitutes patentable invention. (United States Circuit Court of Appeals, Seventh Circuit, Toledo Computing Scale Company vs. Computing Scale Company, 208 Federal Reporter 410.)

EXPEDITING SHIPMENT UNLAWFUL PREFERENCE.—Agreement by a railroad company to expedite interstate shipments for a particular shipment constitutes an unlawful discrimination against other shippers. (Maine Supreme Judicial Court, Johnson vs. New York, New Haven & Hartford Railroad, 88 Atlantic Reporter 988.)

RELIEF AGAINST MISTAKE IN QUOTING PRICE.—Where a seller of a commodity which has a market value of $2.35 per cwt. intends to quote that price, but, through stenographic or other clerical error, inadvertently quotes a price of $1.35, he is entitled to rescind his contract on discovering the mistake, since the buyer is presumed to know that a mistake has been made. But, ordinarily, when a mistake is not material, courts will not relieve the person making it against his own negligence or inattention. (Texas Court of Civil Appeals, Barteldes Seed Company vs. Bennett-Sims Mill & Elevator, 161 Southwestern Reporter 399.)

Trade Publications

Friction Clutches.—Munson Bros. Company, Utica, N. Y. Circular. Contains illustrations and a brief description of a friction clutch for use in a factory, mill or workshop, by which it is possible to disconnect the power from any machine, group of machines, room or department immediately. The advantages of being able to shut down sections of a lineshaft or departments for the purpose of repairs, or running one department while the remainder of the plant is closed, are touched upon. One of the special fields for which the clutches are adapted is high speeds in connection with electrically driven machinery.

Drill Pipe.—National Tube Company, Frick Building, Pittsburgh, Pa. Bulletin No. 15. Devoted to National pipe for drilling purposes. The bulletin contains a complete set of specifications and illustrations and tables, giving the weights and dimensions of drill, special and upset rotary and seamless interior upset drill pipe. An illustration of samples of the pipe, after being subjected to a torsional test ranging from 180,000 to 215,000 lb. per sq. in., is included.

Inspection and Testing Service.—Robert W. Hunt & Co., 90 West street, New York City. Two pamphlets. Describe the service that can be rendered by this firm as consulting engineers for iron and steel manufacturing work, rolling mill equipment, power plants and general industrial work and in the inspection and testing of material of various kinds.

Metal Can Rollers.—Edwards Mfg. Company, Cincinnati, Ohio. Folder. Concerned with a set of tilting rollers for ash cans and other receptacles by which the can is converted into a two-wheel truck or rests flat on the ground at will. A number of views showing the rollers in use are given. An illustrated description of the rollers appeared in *The Iron Age*, December 11, 1913.

Punching and Shearing Machines.—Ironton Punch & Shear Company, Ironton, Ohio. Catalogue No. 12. Illustrates a line of vertical, horizontal and multiple punching machines; plate, bar, universal and gate shearing machines; bending and straightening rolls and coping machines. Practically the entire catalogue is made up of illustrations, there being brief text descriptions under the engravings of the different machines. For the most part a single page is given to each of the several machines.

Brass Foundry Equipment.—J. W. Paxson Company, 1021 North Delaware avenue, Philadelphia, Pa. Bulletin No. 31. Describes and illustrates a line of equipment and supplies for brass, bronze and aluminum foundries. This includes furnaces, tongs and shanks, flasks, ladles, facings, fluxes, molding and core sands, magnetic separators, sprue cutters, ingot molds and tumbling barrels. In addition to the illustrations and brief descriptions tables are given of the different sizes in which some of the apparatus is manufactured.

Milling Machine Arbor.—Grant Mfg. Company, 90 Silliman avenue, Bridgeport, Conn. Folder. Illustrates and describes an internal grip arbor for milling machines. This arbor, an illustrated description of which appeared in *The Iron Age*, December 25, 1913, will grip saws, side-tooth, plain and formed cutters, etc., at the tip and enables cutters of a much smaller diameter than is ordinarily required to be used as no allowance is necessary for the thickness of the collar wall. A turn of a nut on the arbor draws in the sleeve and causes it to expand and bind against the hole in the cutter.

Reinforced Concrete Construction.—Turner Construction Company, 11 Broadway, New York City. Bulletin No. 13. Treats of the various points to be taken into consideration in selecting a concrete contractor, such as experience, organization, speed and financial strength, and shows how this firm will meet all of the requirements. A number of views of typical buildings erected by the company are included.

By-Product Coke Oven.—H. Koppers Company, 5 South Wabash avenue, Chicago, Ill. Bulletin No. 5. Relates to a small by-product coke-oven plant, which is designed so that there is no labor required at night, other than a watchman and the engineer caring for such minor machinery as is required in the by-product house. The ovens, which are rated at 6 tons, are pushed and charged entirely in the daylight hours and can be shut down over Sundays and holidays, if desired. The products of the oven are touched upon, followed by a short description of the operation of the unit. A number of halftone and line engravings are included.

Diamond Tools and Valveless Oilers.—J. L. Osgood, 131 Erie County Bank Building, Buffalo, N. Y. Two folders. The first illustrates a line of diamond tools for truing and shaping emery, corundum and carborundum wheels, grindstones, etc. These are furnished in hand and lathe types, as well as a tool for use in a grinding machine. The other describes and illustrates a valveless oiler of the sight feed type, which is especially adapted for gas, gasoline and steam engines, steam pumps, automobiles, machine tools and general service of all kinds. A number of diagrams, showing the different positions of the pulley or drive spindle on the tank, are given, together with a sectional view of the device. Mention is made of the various supplies, such as wire and leather belts, unions, couplings, valves, etc., that can be supplied for use with the oiler.

Universal Joints.—Spicer Mfg. Company, Plainfield, N. J. Catalogue No. 11. Describes a line of universal joints, which were designed epecially for use in motor car work. Views of the various types are given with tables of the sizes in which they can be supplied and a number of suggestions on the assembling and lubrication of the joints are included.

Railroad Track Supplies.—American Engineering Company, Lebanon, Pa. Two leaflets. Concerned with forged steel rail brace tie plates and forged steel head support washers for screw spikes. Both leaflets are made up for most part of engravings of the devices, there being practically no text matter in either.

Inserted Tooth Saw and Core Jarring Machine.—Tabor Mfg. Company, Eighteenth and Hamilton streets, Philadelphia, Pa. Catalogue and leaflet. The former contains a number of views of a high duty inserted tooth saw that is adapted to meet the general requirements of steel foundries, rail mills, frog and switch shops and structural steel users in general. A number of views are given of the saw in use, with various types of cutting-off machines, and these are followed by views of the saw and pieces that have been cut by it. The leaflet refers to a core jarring machine which has an 18 x 24 in. table and a capacity of 700 lb.

Cylindrical Grinding Machine.—Norton Grinding Company, Worcester, Mass. Folder. Gives general description and specifications for a plain cylindrical grinding machine, which was illustrated in *The Iron Age*, December 25, 1913. The machine is self-contained and is used for grinding soft, tool and hardened steel and cast iron. A number of views of the machine are given, together with a belting diagram and floor plan.

Galvanized Iron Cans and Tanks.—R. E. Chapin Mfg. Works, Batavia, N. Y. Catalogue. Pertains to a line of galvanized oil cans and tanks which are made in a wide range of sizes. These include small portable cans, ranging from 3 to 10 gal. in capacity to shipping cans and pump and storage tanks up to a capacity of 1000 gal. Illustrations of the different cans are given, together with brief descriptions and tables of the sizes in which they can be supplied. A number of pumps are also featured.

Coal.—Clinchfield Fuel Company, Spartanburg, S. C. Album of photographic views. The pictures were taken in and around the Clinchfield mines and are intended to give an idea of the various processes involved in the mining and transportation of coal. The views show scenes in the mining towns where the properties are located and also the underground workings and the transportation lines.

Engines and Boilers.—Clark Engine & Boiler Company, Kalamazoo, Mich. Catalogue K superseding all previous catalogues. Illustrates and describes a line of engines and boilers, both of which are built in a number of different sizes and styles. The engines include automatic and throttling governor side and center crank types, vertical and marine engines and vertical and horizontal gasoline engines. In addition to the brief descriptions of the different engines and boilers, tables of specifications are included. Mention is also made of water heaters and steel jacket kettles.

Screw Machine Products.—National Acme Mfg. Company, Cleveland, Ohio. Folder and sample of work. Shows how it is possible to produce a complicated piece of turning, drilling and countersinking in the same time as it takes to perform the longest single operation in one of the company's automatic multi-spindle screw machines. With this machine it is possible to use any number of tools less than eight simultaneously, and one spindle is held rigid while the remaining ones are revolved for the other operations. By this way of progressive cutting all the tools advance to the work and all cut simultaneously, so that the cost of extra operation is for the tool and the power only.

Metal Faced Pistons.—A. Allan & Son, 486 Greenwich street, New York City. Wall hanger. Points out the advantages of using metal faced pistons, the chief of which are the elimination of excessive friction and wear and the prevention of scoring of the cylinders. Instructions for constructing pistons by the application of the company's metal segment castings are given together with directions for their application. Views are given of some of the rings, together with a detailed drawing of the piston of a rail mill roughing engine to which they have been applied.

Leather Belting.—Graton & Knight Mfg. Company, Worcester, Mass. Catalogue No. 5. Contains a complete description of the company's products, which include leather belting, leather, lace leather, belt cement and dressing, leather packing and strapping, etc. Tables and suggestions for the proper care and ordering of belting, etc., are included.